Appendix D
Soil Boring Logs

AMAI

611 Broadway Suite 907 G
New York, New York 10012

Geologic Boring Log

Final Retention Basin SWMU 14

Boring ID	Client:	Project:	Location
FRB-1	Puerto Rico Sun Oil Co.	RCRA Facility Investigation	Yabucoa, Puerto Rico
Project No.	**AMAI Geologist/Engineer**	**Driller**	**Drilling Contractor**
	Gustavo Felipe	Constancio Olivo	Jaca & Sierra
Date Started	**Date Completed**	**Drilling Method**	**Sampler type**
7/10/96	7/10/96	3.25" ID - 6.00" OD Hollow Stem	2"x 24" Carbon Steel Split Spoon

Depth bgl (ft.)	USCS Symbol	Recovery (per 24")	Blow Counts (6" each)	PID (ppm)	Soil Description (Descriptions made from auger cuttings unless otherwise noted; grain size, sorting, moisture, color/hue etc.)
0	GC			0.0	**0-2 ft** Gravel, sand and silt, some clay, backfill zone. No visible contamination, Dry, Hue 2.5 Y 4/2 Dark grayish brown
1					
2	CL			0.0	**2-4 ft** Clay, sand, and silt little or no gravel. Low plasticity clay. No visible contamination, no product odor.
3					Dry, Hue 2.5 Y 2.5/1 Black
4	CL			0.0	**4-6 ft** Same as above
5					
6	CL			0.0	**6-8 ft** Same as above
7					
8	MH	▼		0.0	**8-10 ft** Clay dense high plasticity inorganic clay (micaceous) Groundwater stabilized at approximately 8.5 ft bgl
9					No visible contamination.
10					
					Drill to 16 ft and install temporary monitoring point at 16 ft. Screen from 6-16 ft bgl.
16					End of boring

Well Construction Details

Casing material	Screen slot size	Screen Interval	Filter Pack	Cap Type
2" X Schedule 40 PVC	0.020 inch.	6-16 ft	No. 2 Silica sand	Watertight

Security casing/manhole:	Lock type:
None	None

Notes:

Well Development Data

Date:	Technique:	Volume purged:
8/8/96	Centrifugal pump using 5/8" high density polyethylene hose.	55 gallons

	Temp (°C)	SC (µS/cm)	pH	Notes: SC- specific conductance
Initial:	25	2,480	5.95	Water clears after development no visible contamination
Final:	25	1,600	6.01	Well dries after few minutes of pumping at 4 gpm

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Geologic Boring Log

Final Retention Basin SWMU 14

Boring ID	Client:	Project:	Location
FRB-2	Puerto Rico Sun Oil Co.	RCRA Facility Investigation	Yabucoa, Puerto Rico
Project No.	**AMAI Geologist/Engineer**	**Driller**	**Drilling Contractor**
	Gustavo Felipe	Constancio Olivo	Jaca & Sierra
Date Started	**Date Completed**	**Drilling Method**	**Sampler type**
7/2/96	7/2/96	3.25" ID - 6.00" OD Hollow Stem	2"x 24" Carbon Steel Split Spoon

Depth bgl (ft.)	USCS Symbol	Recovery (per 24")	Blow Counts (6" each)	PID (ppm)	Soil Description (Descriptions made from auger cuttings unless otherwise noted (grain size, sorting, moisture, color/hue etc.))
0	SP			0.0	**0-2 ft** Gravel sand and silt, backfill zone, Poorly graded, no visible contamination, Dry. Hue 10 YR 5/2 light brownish gray
1					
2	SM			0.0	**2-4 ft** Same as above little or no gravel, No visible contamination, no product odor.
3					
4	SM			0.0	**4-6 ft** Same as above
5					
6	ML			0.0	**6-11 ft** Silty clay very plastic and moist. Little or no sand or gravel or rock fragments. Hue 2.5 Y 4/1 Dark gray
7					
8	ML	▼		0.0	**8 ft** Groundwater stabilized at approximately 8.0 ft bgl No visible contamination. Hue 2.5 Y 4/1 dark gray
↓					Drill to 17 ft bgl and install temporary monitoring well point Screen from 7-17 ft bgl.
17					End boring

Well Construction Details

Casing material	Screen slot size	Screen Interval	Filter Pack	Cap Type
2" X Schedule 40 PVC	0.020 inch.	7-17 ft	No. 2 Silica sand	Watertight

Security casing/manhole:	Lock type:
None	None

Notes:

Well Development Data

Date:	Technique:	Volume purged:
8/8/96	Centrifugal pump using 5/8" high density polyethylene hose.	55 gallons

	Temp (°C)	SC (µS/cm)	pH	Notes: SC - specific conductance
Initial:	25	2,290	6.05	Water clear after development no visible contamination
Final:	25	2,480	6.26	Well dries up after few minutes pumping at 1 gpm

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Geologic Boring Log

North Aeration Basin SWMU 17

Boring ID	Client:	Project:	Location
AB-2	Puerto Rico Sun Oil Co.	RCRA Facility Investigation	Yabucoa, Puerto Rico
Project No.	**AMAI Geologist/Engineer**	**Driller**	**Drilling Contractor**
	Gustavo Felipe	Constancio Olivo	Jaca & Sierra
Date Started	**Date Completed**	**Drilling Method**	**Sampler type**
7/2/96	7/2/96	3.25" ID - 6.00" OD Hollow Stem	2"x 24" Carbon Steel Split Spoon

Depth bgl (ft.)	USCS Symbol	Recovery (per 24")	Blow Counts (6" each)	PID (ppm)	Soil Description (Descriptions made from auger cuttings unless otherwise noted; grain size, sorting, moisture, color/hue etc.)
0	GM			0.0	0-2 ft Gravel, sand, silt and clay mix, backfill zone. Some large rock fragments, no visible contamination, poorly sorted material
1					Dry, Hue 7.5 Y 4/2 Brown
2	CL				2-12 ft Silty clay , high plasticity, moist, dark gray no gravel or rock fragments.
3					Hue 2.5 Y 4/2 brown.
4					
5					
6					
7					
8					
9					
10					
11					
12		▼			12 ft - groundwater encountered, drill to 17 ft and install temporary monitoring well point. Screen 12-17 ft
17					End of boring

Well Construction Details

Casing material	Screen slot size	Screen Interval	Filter Pack	Cap Type
2" X Schedule 40 PVC	0.020 inch.	12-17 ft	No. 2 Silica sand	Water tight

Security casing/manhole:	Lock type:
None	None

Notes:

Well Development Data

Date:	Technique:	Volume purged:
7/19/96	Centrifugal pump using 5/8" high density polyethylene hose.	55 gallons

	Temp (°C)	SC (µS/cm)	pH	Notes:
Initial:	25	1,950	6.24	Water clear after development no visible contamination
Final:	25	2,300	6.16	

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Geologic Boring Log

South Aeration Basin SWMU 18

Boring ID	Client:	Project:	Location
AB-1	Puerto Rico Sun Oil Co.	RCRA Facility Investigation	Yabucoa, Puerto Rico
Project No.	**AMAI Geologist/Engineer**	**Driller**	**Drilling Contractor**
	Gustavo Felipe	Constancio Olivo	Jaca & Sierra
Date Started	**Date Completed**	**Drilling Method**	**Sampler type**
7/2/96	7/2/96	3.25" ID - 6.00" OD Hollow Stem	2"x 24" Carbon Steel Split Spoon

Depth bgl (ft.)	USCS Symbol	Recovery (per 24")	Blow Counts (6" each)	PID (ppm)	Soil Description (Descriptions made from auger cuttings unless otherwise noted (grain size, sorting, moisture, color/hue etc.))
0	GM			0.0	**0-2 ft** - Sand silt and gravel , backfill zone, abundant rock fragments
1					No visible contamination Hue 7.5 Y 4/3 brown.
2	GM				No change in lithology from 2 to 8 feet.
3					
4	GM				
5					
6	GM				
7					
8	CL	▼			**8-10 ft** Slight change to sandy clay at 8 ft. No visible contamination throughout
9					Groundwater at 8 ft
10					Hue 2.5 Y 4/2 brown Groundwater stabilized at approximately 8 ft. Drill to 13 ft installed a 2" temporary monitoring point at 13 ft bgl.
11					Screened interval 8-13 ft
12					
13					End of boring
14					

Well Construction Details

Casing material	Screen slot size	Screen Interval	Filter Pack	Cap Type
2" X Schedule 40 PVC	0.020 inch	8-13 ft	No. 2 Silica sand	Water tight

Security casing/manhole:	Lock type:
None	None

Notes:

Well Development Data

Date:	Technique:	Volume purged:
7/19/96	Centrifugal pump using 5/8" high density polyethylene hose.	55 gallons

	Temp (°C)	SC (µS/cm)	pH	Notes: SC -specific conductance
Initial:	25	2,220	6.80	Water still slightly silty after development no visible contamination
Final:	25	2,280	6.83	

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Geologic Boring Log

Slop Oil Tank 103 SWMU 35

Boring ID	Client:	Project:	Location
35-01	Puerto Rico Sun Oil Company	RCRA Facility Investigation	Yabucoa, Puerto Rico
Project No.	**AMAI Geologist/Engineer**	**Driller**	**Drilling Contractor**
	Gustavo Felipe	Constancio Olivo	Jaca & Sierra
Date Started	**Date Completed**	**Drilling Method**	**Sampler type**
7/23/96	7/23/96	Tripod	2"x 24" Carbon Steel Split Spoon

Depth bgl (ft.)	USCS Symbol	Recovery (per 24")	Blow Counts (per 6")	PID (ppm)	Soil Description (Descriptions made from auger cuttings, unless otherwise noted. (grain size, sorting, moisture, color/hue etc.)
0	GM	18"	5-10-7-8	13.0	0-4" Concrete coring. 4"-2 ft Backfill zone, large gravel and silty clay mix, poorly sorted Well compacted spoon, Top of spoon has some hydrocarbon odor and visible stains, Dry throughout, Hue #1 for gley 5/5 GY greenish gray. Full analysis and Immunoassay samples collected.
1					
	Sample collected				
2	GM	18"	4-4-4-7	0.0	2-4 ft - Same as above no visible contamination, Full analysis and Immunoassay samples collected.
3	**Sample collected**				
4					4-6 ft -Drill using drive point to 6 ft.
5					
6	MH	20"	11-13 12-10	0.0	6-8ft Clay - high plasticity dense (micaceous) little or no sand or gravel, some silt. Well compacted spoon no visible contamination moist. Hue 7.5 YR 2.5/1 Black Full analysis and Immunoassay samples collected.
7	**Sample collected**				
8					End of boring. Grout hole to 4 ft bgl and repaired concrete core.
9					

Soil Descriptions*

Type	Size (mm)			Gravel	Sym		Silt & Clay	Sym	
	Coarse	*Medium*	*Fine*	no fines	GW	well graded gravel	*Inorganic*		
Gravel	19-75		4.8-19	little fines	GP	poorly graded gravel	low plast.	ML	silts and very fine sand
Sand	2.0-4.8	.43-2.0	08-.043	some fines	GM	sand,silt,gravel mix	low plast.	CL	gravelly, sandy, silty clay
Silt & clay			<.08	some fines	GC	sand,clay,gravel,mix	high plast.	MH	micaceous/diatomaceous
Soil density	very loose	loose	med. dense	**Sand**			high plast.	CH	high plasticity clay
	dense	very dense		no fines	SW	well graded gravelly	*Organic*		
Angularity	very ang.	angular	sub angular	little fines	SP	poorly graded gravelly	low plast.	OL	silty clay low plasticity
	sub round	rounded	well round	some fines	SM	silty-sand sandy-silt	high plast.	OH	clay med. to high plasticity
Note - density also in blows/foot above				some fines	SC	sand clay mixture	Peat	PT	humus, swamp soils, organic

* Source Unified Soil Classification System

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Geologic Boring Log

Slop Oil Tank 103 SWMU 35

Boring ID	Client:	Project:	Location
35-02	Puerto Rico Sun Oil Company	RCRA Facility Investigation	Yabucoa, Puerto Rico
Project No.	**AMAI Geologist/Engineer**	**Driller**	**Drilling Contractor**
	Gustavo Felipe	Constancio Olivo	Jaca & Sierra
Date Started	**Date Completed**	**Drilling Method**	**Sampler type**
7/23/96	7/23/96	Tripod	2"x 24" Carbon Steel Split Spoon

Depth bgl (ft.)	USCS Symbol	Recovery (per 24")	Blow Counts (per 6")	PID (ppm)	Soil Description Descriptions made from auger cuttings, unless otherwise noted. (grain size, sorting, moisture, color/hue etc.)
0	GM	22"	6-11-7-7	0.0	**0-2 ft** Gravel backfill zone, large gravel, sand, silt, and clay mix Poorly sorted well compacted no visible contamination, Dry Hue #1 for gley 5/5 GY greenish gray
1					Full analysis and Immunoassay samples collected.
	Sample collected				
2	GM	24"	5-7-28-28	0.0	**2-4 ft** - Same as above no visible contamination, Full analysis and Immunoassay samples collected.
3	**Sample collected**				
4					**4-6 ft** -Drill using drive point to 6 ft.
5					
6	MH	24"	16-20-25-20	0.0	**6-8ft** Clay - high plasticity dense (micaceous) little or no sand or gravel, some silt. Well compacted spoon no visible contamination moist. Hue 7.5 YR 2.5/1 Black
7	**Sample collected**				Full analyses and Immunoassay sample collected.
8					End of boring.
9					

Soil Descriptions*

Type	Size (mm)			Gravel	Sym		Silt & Clay	Sym	
	Coarse	*Medium*	*Fine*	no fines	GW	well graded gravel	*Inorganic*		
Gravel	19-75		4.8-19	little fines	GP	poorly graded gravel	low plast.	ML	silts and very fine sand
Sand	2.0-4.8	.43-2.0	.08-.043	some fines	GM	sand,silt,gravel mix	low plast.	CL	gravelly, sandy, silty clay
Silt & clay			<.08	some fines	GC	sand,clay,gravel,mix	high plast.	MH	micaceous/diatomaceous
Soil density	very loose	loose	med dense	**Sand**			high plast.	CH	high plasticity clay
	dense	very dense		no fines	SW	well graded gravelly	*Organic*		
Angularity	very ang.	angular	sub angular	little fines	SP	poorly graded gravelly	low plast.	OL	silty clay low plasticity
	sub round	rounded	well round	some fines	SM	silty-sand sandy-silt	high plast.	OH	clay med. to high plasticity
Note - density also in blows/foot above				some fines	SC	sand clay mixture	Peat	PT	humus, swamp soils, organic

* Source Unified Soil Classification System

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Geologic Boring Log

Dissolved Air Flotation Unit SWMU 36

Boring ID	Client:	Project:	Location
36-01	Puerto Rico Sun Oil Company	RCRA Facility Investigation	Yabucoa, Puerto Rico
Project No.	**AMAI Geologist/Engineer**	**Driller**	**Drilling Contractor**
	Néstor M. Rivera	Constancio Olivo	Jaca & Sierra
Date Started	**Date Completed**	**Drilling Method**	**Sampler type**
7/18/96	7/18/96	Tripod	2"x 24" Carbon Steel Split Spoon

Depth bgl (ft)	USCS Symbol	Recovery (per 24")	Blow Counts (per 6")	PID (ppm)	Soil Description Description made from auger cuttings, unless otherwise noted. (grain size, sorting, moisture, color/hue etc.)
0	SM	14	2-2-4-6	15	**0-2 ft.** Sand to silty sand to sandy clay. Poorly graded, loose to stiff, slightly moist to wet, dark greenish brown (2.5Y 4/2) to dark greenish gray (Gley 2, 4/1, 5BG). Quartz sand, mica, pyrite, and lithic fragments varying in size from fine to coarse.
1	Sample collected				
2	CL	12	4-4-5-6	2	Hydrocarbon odor and staining observed. Immunoassay sample collected.
3					**2-4 ft.** Sandy clay, stiff, slightly moist, dark greenish gray (Gley 1, 4/1, 5GY) Quartz sand, mica, pyrite, and lithic fragments
4	Sample collected				varying in size from fine to coarse. Slight hydrocarbon odor. Immunoassay sample collected.
5					
6	CL, SM	14	7-6-10-15	1	**6-8 ft.** Sandy clay to sand, soft to loose, slightly moist to moist, dark greenish gray (Gley 1, 4/1,5GY). Quartz sand, mica, pyrite, and lithic fragments varying in size from fine to coarse. Slight.
7					hydrocarbon odor.
8	Sample collected	▼			Immunoassay sample collected. Drilling groundwater encountered at 8 ft. Boring terminated.
					End of boring.

Soil Descriptions*

Type	Size (mm)			Gravel	Sym		Silt & Clay	Sym	
	Coarse	*Medium*	*Fine*	no fines	GW	well graded gravel	*Inorganic*		
Gravel	19-75		4.8-19	little fines	GP	poorly graded gravel	low plast.	ML	silts and very fine sand
Sand	2.0-4.8	.43-2.0	.08-.043	some fines	GM	sand,silt,gravel mix	low plast.	CL	gravelly,sandy,silty clay
Silt & clay			<.08	some fines	GC	sand,clay,gravel,mix	high plast.	MH	micaceous/diatomaceous
Soil density	very loose	loose	med. dense	Sand			high plast.	CH	high plasticity clay
	dense	very dense		no fines	SW	well graded gravelly	*Organic*		
Angularity	very ang.	angular	sub angular	little fines	SP	poorly graded gravelly	low plast.	OL	silty clay low plasticity
	sub round	rounded	well round	some fines	SM	silty-sand sandy-silt	high plast.	OH	clay med. to high plasticity
Note - density also in blows/foot above				some fines	SC	sand clay mixture	Peat	PT	humus,swamp soils, organic

* Source Unified Soil Classification System.

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Geologic Boring Log

Dissolved Air Flotation Unit SWMU 36

Boring ID	Client:	Project:	Location
36-02	Puerto Rico Sun Oil Company	RCRA Facility Investigation	Yabucoa, Puerto Rico
Project No.	**AMAI Geologist/Engineer**	**Driller**	**Drilling Contractor**
	Gustavo Felipe	Constancio Olivo	Jaca & Sierra
Date Started	**Date Completed**	**Drilling Method**	**Sampler type**
7/23/96	7/23/96	3.25"ID - 6.00"OD Hollow Stem Auger	2"x 24" Carbon Steel Split Spoon

Depth bgl (ft.)	USCS Symbol	Recovery (per 24")	Blow Counts (per 6")	PID (ppm)	Soil Description Descriptions made from auger cuttings, unless otherwise noted. (grain size, sorting, moisture, color/hue etc.)
0	GM	16"	1-4-4-3	68.0	0-2 ft Top 4" gravel landscape fill, 4" -2 ft Gravel and silty clay mix Backfill zone Poorly sorted, no visible contamination, moist
1					Full analysis and Immunoassay samples collected.
	Sample collected				
2	GM	18"	4-5-6-9	32.0	2-4 ft Same as above, still in backfill zone, strong product odor Full analysis and Immunoassay samples collected.
3	Sample collected				
4	ML	16"	7-7-8-9	0.0	4-6 ft Silty clay (micaceous) dense high plasticity little or no gravel or sand, no product odor, dry. Hue #1 for gley 4/5 GY Dark greenish gray
5					
6	ML	12"	1-3-6-7	0.0	6-8 ft Silty clay (micaceous) little or no gravel some sand, no visible contamination, dry. Hue #1 for gley 2.5 10 Y Greenish black.
7	Sample collected				Full analysis and Immunoassay samples collected.
8					End of boring. Grout hole to surface.
9					

Soil Descriptions*

Type	Size (mm)			Gravel	Sym		Silt & Clay	Sym	
	Coarse	*Medium*	*Fine*	no fines	GW	well graded gravel	*Inorganic*		
Gravel	19-75		4.8-19	little fines	GP	poorly graded gravel	low plast.	ML	silts and very fine sand
Sand	2.0-4.8	.43-2.0	.08-.043	some fines	GM	sand,silt,gravel mix	low plast.	CL	gravelly, sandy, silty clay
Silt & clay			<.08	some fines	GC	sand,clay,gravel,mix	high plast.	MH	micaceous/diatomaceous
Soil density	very loose	loose	med. dense	Sand			high plast.	CH	high plasticity clay
	dense	very dense		no fines	SW	well graded gravelly	*Organic*		
Angularity	very ang.	angular	sub angular	little fines	SP	poorly graded gravelly	low plast.	OL	silty clay low plasticity
	sub round	rounded	well round	some fines	SM	silty-sand sandy-silt	high plast.	OH	clay med. to high plasticity
Note - density also in blows/foot above				some fines	SC	sand clay mixture	Peat	PT	humus, swamp soils, organic

* Source Unified Soil Classification System.

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Geologic Boring Log

Dissolved Air Flotation Unit SWMU 36

Boring ID	Client:	Project:	Location
36-03	Puerto Rico Sun Oil Company	RCRA Facility Investigation	Yabucoa, Puerto Rico
Project No.	**AMAI Geologist/Engineer**	**Driller**	**Drilling Contractor**
	Gustavo Felipe	Constancio Olivo	Jaca & Sierra
Date Started	**Date Completed**	**Drilling Method**	**Sampler type**
7/3/96	7/3/96	3.25" ID - 6.00" OD Hollow Stem Auger	2"x 24" Carbon Steel Split Spoon

Depth bgl (ft.)	USCS Symbol	Recovery (per 24")	Blow Counts (per 6")	PID (ppm)	Soil Description Description made from auger cuttings, unless otherwise noted. (grain size, sorting, moisture, color/hue etc.)
0	GM	12"	0-0-10-5	0.0	0-1ft Gravel and large stone backfill 1st foot dug by hand
1	Sample collected				1-2 ft Abundant rock fragments and mica. Moist Hue #1 for gley 5/10 greenish gray. Immunoassay sample collected.
2	GM	18"	7-7-7-5	0.0	2-4 ft Same as above. No visual contamination Immunoassay sample collected.
3	Sample collected				Drill to 6 ft using drive point.
4					
5					
6	ML	24"	2-3-3-4	0.0	6-8 ft Silty clay - little or no sand or gravel. Poorly sorted, loosely packed spoon No visual contamination. Moist, Hue 2.5 Y 4/3 Olive Brown.
7	Sample collected				Immunoassay sample collected.
8					End of boring. Grout to surface.
9					

Soil Descriptions*

Type	Size (mm)			Gravel	Sym		Silt & Clay	Sym	
	Coarse	*Medium*	*Fine*	no fines	GW	well graded gravel	*Inorganic*		
Gravel	19-75		4.8-19	little fines	GP	poorly graded gravel	low plast.	ML	silts and very fine sand
Sand	2.0-4.8	.43-2.0	.08-.043	some fines	GM	sand,silt,gravel mix	low plast.	CL	gravelly,sandy,silty clay
Silt & clay			<.08	some fines	GC	sand,clay,gravel,mix	high plast.	MH	micaceous/diatomaceous
Soil density	very loose	loose	med. dense	Sand			high plast.	CH	high plasticity clay
	dense	very dense		no fines	SW	well graded gravelly	*Organic*		
Angularity	very ang.	angular	sub angular	little fines	SP	poorly graded gravelly	low plast.	OL	silty clay low plasticity
	sub round	rounded	well round	some fines	SM	silty-sand sandy-silt	high plast.	OH	clay med. to high plasticity
Note - density also in blows/foot above				some fines	SC	sand clay mixture	Peat	PT	humus,swamp soils, organic

* Source Unified Soil Classification System.

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Geologic Boring Log

Dissolved Air Flotation Unit SWMU 36

Boring ID	Client:	Project:	Location
36-04	Puerto Rico Sun Oil Company	RCRA Facility Investigation	Yabucoa, Puerto Rico
Project No.	**AMAI Geologist/Engineer**	**Driller**	**Drilling Contractor**
	Néstor M. Rivera	Constancio Olivo	Jaca & Sierra
Date Started	**Date Completed**	**Drilling Method**	**Sampler type**
7/17/96	7/17/96	Tripod	2"x 24" Carbon Steel Split Spoon

Depth bgl (ft.)	USCS Symbol	Recovery (per 24")	Blow Counts (per 6")	PID (ppm)	Soil Description Description made from auger cuttings, unless otherwise noted. (grain size, sorting, moisture, color/hue etc.)
0	SP, SM	10	3-4-3-3	15	**0-2 ft.** Silty sand to gravelly silty sand. Poorly graded, loose, slightly moist, dark brown (10YR3/3) to dark greenish gray (Gley 1,3/1,5G). Quartz sand, mica, pyrite and lithic fragments varying in size from fine to coarse. Hydrocarbon odor and visible product.
1					
	Sample collected				
2	CL	14	3-2-3-6	17	Full analysis and Immunoassay samples collected. **2-4 ft.** Sandy clay. Stiff, slightly moist, dark greenish gray (Gley 1, 3/1,10Y) Quartz sand, mica, pyrite and lithic fragments varying in size from fine to coarse. Slight odor.
3	Sample collected				
4					Full analysis, Immunoassay and physiochemical samples collected
5					No sample collected.
6	SM	NR	-9-11-1	12	**6-8 ft.** Sandy clay, stiff, wet, dark greenish gray (Gley 1,3/1,5GY) to black (Gley 1,2.5/N). Sand composed of quartz, mica, pyrite and lithic fragments varying in size from fine to coarse. Hydrocarbon odor. Full analysis, immunoassay and physiochemical samples collected.
7	Sample collected				
8					
		18	5-4-7-9	18	Boring was offset because no recovery at original location. Offset boring was to collect 6-8 ft. sample.
					End of boring. Grout to surface.

Soil Descriptions*

Type	Size (mm)			Gravel	Sym		Silt & Clay	Sym	
	Coarse	*Medium*	*Fine*	no fines	GW	well graded gravel	*Inorganic*		
Gravel	19-75		4.8-19	little fines	GP	poorly graded gravel	low plast.	ML	silts and very fine sand
Sand	2.0-4.8	.43-2.0	.08-.043	some fines	GM	sand,silt,gravel mix	low plast.	CL	gravelly,sandy,silty clay
Silt & clay			<.08	some fines	GC	sand,clay,gravel,mix	high plast.	MH	micaceous/diatomaceous
Soil density	very loose	loose	med. dense	Sand			high plast.	CH	high plasticity clay
	dense	very dense		no fines	SW	well graded gravelly	*Organic*		
Angularity	very ang.	angular	sub angular	little fines	SP	poorly graded gravelly	low plast.	OL	silty clay low plasticity
	sub round	rounded	well round	some fines	SM	silty-sand sandy-silt	high plast.	OH	clay med. to high plasticity
Note - density also in blows/foot above				some fines	SC	sand clay mixture	Peat	PT	humus,swamp soils, organic

* Source Unified Soil Classification System.

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Geologic Boring Log

Dewatering Chamber SWMU 38

Boring ID	Client:	Project:	Location
38-01	Puerto Rico Sun Oil Company	RCRA Facility Investigation	Yabucoa, Puerto Rico
Project No.	**AMAI Geologist/Engineer**	**Driller**	**Drilling Contractor**
	Gustavo Felipe	Constancio Olivo	Jaca & Sierra
Date Started	**Date Completed**	**Drilling Method**	**Sampler type**
7/10/96	7/10/96	3.25" ID - 6.00" OD Hollow Stem Auger	2"x 24" Carbon Steel Split Spoon

Depth bgl (ft.)	USCS Symbol	Recovery (per 24")	Blow Counts (per 6")	PID (ppm)	Soil Description Description made from auger cuttings, unless otherwise noted. (grain size, sorting, moisture, color/hue etc.)
0	GM	15"	4-13 14-10	0.0	**0-2 ft** Gravel sand and silt mix, poorly sorted , loosely packed, backfill zone No visible contamination, dry throughout, gray. Hue #1 for gley 5/5 GY greenish
1	**Sample collected**				Immunoassay sample collected.
2	GM	18"	6-7-6-6	0.0	**2-4 ft** Same as above, slightly darker, no visible contamination, Immunoassay sample collected.
3	**Sample collected**				Drill to 6 ft and collect sample for analysis
4	GM			0.0	**4-6 ft** Same as above.
5					
6	ML	22"	1-2-6-4	0.0	**6-8 ft** Top of spoon (6-7ft) - Silt and clay Bottom of spoon (7-8ft) - Sand silt and abundant pyrite and mica little or no gravel, saturated at tip, no visible contamination, transition
7	**Sample collected**	▼			zone from silty sand to med sand, Dry at top 12" saturated bottom 10". Hue 10 YR 4/3 reddish brown. Immunoassay sample collected.
8					End of boring. Grouted to surface.

Soil Descriptions*

Type	Size (mm)			Gravel	Sym		Silt & Clay	Sym	
	Coarse	*Medium*	*Fine*	no fines	GW	well graded gravel	*Inorganic*		
Gravel	19-75		4.8-19	little fines	GP	poorly graded gravel	low plast.	ML	silts and very fine sand
Sand	2.0-4.8	43-2.0	.08-.043	some fines	GM	sand,silt,gravel mix	low plast.	CL	gravelly,sandy,silty clay
Silt & clay			<.08	some fines	GC	sand,clay,gravel,mix	high plast.	MH	micaceous/diatomaceous
Soil density	very loose	loose	med. dense	**Sand**			high plast.	CH	high plasticity clay
	dense	very dense		no fines	SW	well graded gravelly	*Organic*		
Angularity	very ang.	angular	sub angular	little fines	SP	poorly graded gravelly	low plast.	OL	silty clay low plasticity
	sub round	rounded	well round	some fines	SM	silty-sand sandy-silt	high plast.	OH	clay med. to high plasticity
Note - density also in blows/foot above				some fines	SC	sand clay mixture	**Peat**	PT	humus,swamp soils, organic

* Source Unified Soil Classification System.

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New York, New York 10012

Geologic Boring Log

Dewatering Chamber SWMU 38

Boring ID	Client:	Project:	Location
38-02	Puerto Rico Sun Oil Co.	RCRA Facility Investigation	Yabucoa, Puerto Rico
Project No.	**AMAI Geologist/Engineer**	**Driller**	**Drilling Contractor**
	Gustavo Felipe	Constancio Olivo	Jaca & Sierra
Date Started	**Date Completed**	**Drilling Method**	**Sampler type**
7/11/96	7/11/96	3.25" ID - 6.00" OD Hollow Stem	2"x 24" Carbon Steel Split Spoon

Depth bgl (ft.)	USCS Symbol	Recovery (per 24")	Blow Counts (6" each)	(ppm)	Soil Description (Description made from auger cuttings, unless otherwise noted. (grain size, sorting, moisture, color/hue etc.))
0	GM	24"	4-12 12-9	0.0	**0-2 ft** Gravel sand and silt mix, poorly sorted , loosely packed, backfill zone No visible contamination, dry throughout, Hue #1 for gley 5/5 GY greenish gray. Full analysis and Immunoassay samples collected.
1	**Sample collected**				
2	GM	23"	6-7-6-6	0.0	**2-4 ft** Same as above, slightly darker, no visible contamination, not as dry Full analysis and Immunoassay samples collected.
3	**Sample collected**				Drill to 6 ft and collect sample for analysis
4				0.0	**4-6 ft** same as above
5					
6	ML	22"	1-1-2-3	0.0	**6-8 ft** Top of spoon (6-7ft) - Silt sand and clay, dry, low plasticity, no gravel or larger sizes, Micaceous. Bottom of spoon (7-8ft) - Sand silt and abundant pyrite and mica little or no gravel, saturated at tip, no visible contamination, transition zone from silty sand to sand, Dry at top 12" saturated bottom 10". Top - Hue chart #1 for gley 4/10 Dark greenish gray. Bottom - Hue 10 YR dark greenish brown Full analysis and Immunoassay sample collected. Duplicate taken (9.0-9.5) Installed temporary monitoring well point at 11 ft bgl
7	**Sample collected**				
8		▼			
▼					
11					

Well Construction Details

Casing material	Screen slot size	Screen Interval	Filter Pack	Cap Type
2" X Schedule 40 PVC	0.020 inch	6-11 ft	No. 2 Silica sand	Watertight

Security casing/manhole:	Lock type:
none	none

Notes:

Well Development Data

Date:	Technique:	Volume purged:
7/22/96	Centrifugal pump using 5/8" high density polyethylene hose.	55 Gallons

	Temp (°C)	SC (µS/cm)	pH	Notes: SC- specific conductance
Initial:	25	1,510	7.3	Purge water clear after pumping
Final:	25	1,440	6.96	SC - specific conductance

Prepared 6/11/97

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Geologic Boring Log

Dewatering Chamber SWMU 38

Boring ID	Client:	Project:	Location
38-03	Puerto Rico Sun Oil Company	RCRA Facility Investigation	Yabucoa, Puerto Rico
Project No.	**AMAI Geologist/Engineer**	**Driller**	**Drilling Contractor**
	Gustavo Felipe	Constancio Olivo	Jaca & Sierra
Date Started	**Date Completed**	**Drilling Method**	**Sampler type**
7/11/96	7/11/96	3.25" ID - 6.00" OD Hollow Stem Auger	2"x 24" Carbon Steel Split Spoon

Depth bgl (ft.)	USCS Symbol	Recovery (per 24")	Blow Counts (per 6")	PID (ppm)	Soil Description Description made from auger cuttings, unless otherwise noted. (grain size, sorting, moisture, color/hue etc.)
0	GM	24"	55-47 41-26	0.0	**0-2 ft** Gravel sand and silt mix, poorly sorted , well packed, backfill zone No visible contamination, dry throughout, Hue 10 YR 4/3 brown. Immunoassay sample collected.
1	**Sample collected**				
2	CL	24"	9-10 11-13	0.0	**2-4 ft** Top of spoon (0-6") same as above. Bottom of spoon - Gravel and fine sand, abundant dolomite rock fragments, no visible contamination, dry, very well packed spoon. Hue 5Y 3/2
3	**Sample collected**				Dark olive gray. Immunoassay sample collected.
4	CL			0.0	**4-6 ft** Same as above
5					
6	CL	24"	1-1-3-4	0.0	**6-8 ft** Top of spoon (16") - Silt, sand and clay Bottom of spoon (7-8ft) - Clay, Sand, and silt, abundant pyrite and mica little or no gravel, saturated at tip, no visible contamination, transition zone from silty sand to med sand, dry at top 16" saturated bottom 8".
7	**Sample collected**				Top - Hue #1 for gley 4/10 Dark greenish gray Bottom - Hue 10 YR 4/2 Dark grayish brown.
8		▼			Immunoassay sample collected. End of boring. Grouted to surface.

Soil Descriptions*

Type	Size (mm)			Gravel	Sym		Silt & Clay	Sym	
	Coarse	*Medium*	*Fine*	no fines	GW	well graded gravel	*Inorganic*		
Gravel	19-75	[illegible]	4.8-19	little fines	GP	poorly graded gravel	low plast.	ML	silts and very fine sand
Sand	2.0-4.8	43-2.0	.08-.043	some fines	GM	sand,silt,gravel mix	low plast.	CL	gravelly,sandy,silty clay
Silt & clay	[illegible]		<.08	some fines	GC	sand,clay,gravel,mix	high plast.	MH	micaceous/diatomaceous
Soil density	very loose	loose	med. dense	Sand			high plast.	CH	high plasticity clay
	dense	very dense		no fines	SW	well graded gravelly	*Organic*		
Angularity	very ang.	angular	sub angular	little fines	SP	poorly graded gravelly	low plast.	OL	silty clay low plasticity
	sub round	rounded	well round	some fines	SM	silty-sand sandy-silt	high plast.	OH	clay med. to high plasticity
Note - density also in blows/foot above				some fines	SC	sand clay mixture	Peat	PT	humus,swamp soils, organic

* Source Unified Soil Classification System

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Geologic Boring Log

Dewatering Chamber SWMU 38

Boring ID	Client:	Project:	Location
38-04	Puerto Rico Sun Oil Company	RCRA Facility Investigation	Yabucoa, Puerto Rico
Project No.	**AMAI Geologist/Engineer**	**Driller**	**Drilling Contractor**
	Néstor M. Rivera	Constancio Olivo	Jaca & Sierra
Date Started	**Date Completed**	**Drilling Method**	**Sampler type**
7/22/96	7/22/96	Tripod	2"x 24" Carbon Steel Split Spoon

Depth bgl (ft.)	USCS Symbol	Recovery (per 24")	Blow Counts (per 6")	PID (ppm)	Soil Description (Description made from auger cuttings, unless otherwise noted. (grain size, sorting, moisture, color/hue etc.))
0	GM	ND	1-1-1-1	0.0	**0-2 ft.** Sandy gravel. Poorly sorted, wet to saturated, loose, light olive brown (2.5Y5/3). Sand varies in size from fine to very coarse, composed of quartz, mica, pyrite and lithic fragments. Gravel composed of granodiorite frag, Full analysis and Immunoassay samples collected
1	**Sample collected**				
2	SP	ND	3-9-5-8	0.0	**2-4 ft.** Silty gravelly sand. Poorly sorted, wet, light olive brown (2.5Y5/3). Sand varies in size from fine to very coarse, composed of quartz, mica, pyrite, and lithic fragments. Gravel composed of granodiorite. Full analysis and Immunoassay samples collected
3	**Sample collected**				
4	SM	ND	3-8-14-42	0.0	**4-6 ft.** Sand. loose, wet, light yellowish brown (2.5Y6/3) Sand composed of quartz, mica, pyrite and lithic fragments, varying in size from fine to coarse. Boring terminated
5					
6	MH	18"	107-47	0.0	**6-8 ft.** Boring continued on 7/23/96 at 0900 due to refusal. Clay and sand mix, micaceous, low plasticity, very stiff, no visual contamination Hue # 1 for gley 4/10 dark green gray Full analysis and Immunoassay samples collected
	Sample collected		27-19		
7					
8					
9					
10					

Soil Descriptions*

Type	Size (mm)			Gravel	Sym		Silt & Clay	Sym	
	Coarse	*Medium*	*Fine*	no fines	GW	well graded gravel	*Inorganic*		
Gravel	19-75		4.8-19	little fines	GP	poorly graded gravel	low plast.	ML	silts and very fine sand
Sand	2.0-4.8	.43-2.0	.08-.043	some fines	GM	sand,silt,gravel mix	low plast.	CL	gravelly,sandy,silty clay
Silt & clay			<.08	some fines	GC	sand,clay,gravel,mix	high plast.	MH	micaceous/diatomaceous
Soil density	very loose	loose	med. dense	Sand			high plast.	CH	high plasticity clay
	dense	very dense		no fines	SW	well graded gravelly	*Organic*		
Angularity	very ang.	angular	sub angular	little fines	SP	poorly graded gravelly	low plast.	OL	silty clay low plasticity
	sub round	rounded	well round	some fines	SM	silty-sand sandy-silt	high plast.	OH	clay med. to high plasticity
Note - density also in blows/foot above				some fines	SC	sand clay mixture	Peat	PT	humus,swamp soils, organic

* Source Unified Soil Classification System

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Geologic Boring Log

Hazardous Waste Mixing Box SWMU 39

Boring ID	Client:	Project:	Location
39-01	Puerto Rico Sun Oil Company	RCRA Facility Investigation	Yabucoa, Puerto Rico
Project No.	**AMAI Geologist/Engineer**	**Driller**	**Drilling Contractor**
	Gustavo Felipe	Constancio Olivo	Jaca & Sierra
Date Started	**Date Completed**	**Drilling Method**	**Sampler type**
6/28/96	6/28/96	3.25" ID - 6.00" OD Hollow Stem	2"x 24" Carbon Steel Split Spoon

Depth bgl (ft.)	USCS Symbol	Recovery (per 24")	Blow Counts (per 6")	PID (ppm)	Soil Description (Description made from auger cuttings, unless otherwise noted. (grain size, sorting, moisture, color/hue etc.))
0	SC	13"	3-3-4-7	0.0	**0-2 ft** Sand and clay mix, Little or no larger sizes, no rock fragments Backfill zone, very dry, well packed, Hue 10.5 YR 4/3 brown
	Sample collected				no visible contamination. sample collected for
1					Full analysis and Immunoassay samples collected.
2		18"	6-10	16.0	**2-4 ft** Sand, silt, clay, rock fragments, still backfill zone,
	SM		15-11		**Top 6"**- Brown, dry, silty sand
3	SM				**Middle 6"** - Black, dry, silty sand, strong hydrocarbon odor
	Sample collected				
	SP				**Bottom 6"** - Brown, sand and gravel mix, loosely packed, no product odor.
4	SM			0.7	**4-6 ft** Sand and silt mix, same as above, faint hydrocarbon odor. Soil appears stained with black tar-like substance. Full analysis and Immunoassay samples collected.
					Drilled to 10 feet and collected splitspoon soil sample.
10	SC	24"	2-3-11-17	0.3	**10-12 ft** Sand, silt and clay, Low plasticity clay, faint product odor, Dry at top moist at the bottom 2", Hue #2 for gley 3/10G Dark greenish gray. Full analysis and Immunoassay samples collected
	Sample collected				Collected a **duplicate** sample from 15-16 ft.

Soil Descriptions*

Type	Size (mm)			Gravel	Sym		Silt & Clay	Sym	
	Coarse	*Medium*	*Fine*	no fines	GW	well graded gravel	*Inorganic*		
Gravel	19-75		4.8-19	little fines	GP	poorly graded gravel	low plast.	ML	silts and very fine sand
Sand	2.0-4 8	.43-2.0	.08-.043	some fines	GM	sand,silt,gravel mix	low plast.	CL	gravelly,sandy,silty clay
Silt & clay			<.08	some fines	GC	sand,clay,gravel,mix	high plast.	MH	micaceous/diatomaceous
Soil density	very loose	loose	med. dense	**Sand**			high plast.	CH	high plasticity clay
	dense	very dense		no fines	SW	well graded gravelly	*Organic*		
Angularity	very ang.	angular	sub angular	little fines	SP	poorly graded gravelly	low plast.	OL	silty clay low plasticity
	sub round	rounded	well round	some fines	SM	silty-sand sandy-silt	high plast.	OH	clay med to high plasticity
Note - density also in blows/foot above				some fines	SC	sand clay mixture	**Peat**	PT	humus,swamp soils, organic

* Source Unified Soil Classification System.

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Geologic Boring Log

Hazardous Waste Mixing Box SWMU 39

Boring ID	Client:	Project:	Location
39-02	Puerto Rico Sun Oil Company	RCRA Facility Investigation	Yabucoa, Puerto Rico
Project No.	**AMAI Geologist/Engineer**	**Driller**	**Drilling Contractor**
	Gustavo Felipe	Constancio Olivo	Jaca & Sierra
Date Started	**Date Completed**	**Drilling Method**	**Sampler type**
6/28/96	6/28/96	3.25" ID - 6.00" OD Hollow Stem	2"x 24" Carbon Steel Split Spoon

Depth bgl (ft) •	USCS Symbol	Recovery (per 24")	Blow Counts (per 6")	PID (ppm)	Soil Description (Description made from auger cuttings, unless otherwise noted. (grain size, sorting, moisture, color/hue etc.)
0	SC	24"	4-8-8-6	0.0	0-2 ft Sand and clay mix, Little or no larger sizes, abundant rock fragments . and gravel Backfill zone, very dry, well packed, Hue 10.5 YR 4/3 brown no visible contamination.
1	Sample collected				Immunoassay sample collected.
2	SM	24"	5-3-9-9	3.0	2-4 ft Sand, silt, clay, rock fragments, still backfill zone, Strong product odor, soil appears stained with black tar-like substance.
3	Sample collected				Immunoassay sample collected.
4	SM			3.7	4-6 ft Same as above
10	SC	16"	2-3-5-5	0.3	10-12 ft Top of spoon 8" sandy clay Bottom of spoon 8", sandy silt little gravel, some rock fragments, Visual contamination and slight hydrocarbon odor
	Sample collected				Full analysis sample collected.

Soil Descriptions*

Type	Size (mm)			Gravel	Sym		Silt & Clay	Sym	
	Coarse	*Medium*	*Fine*	no fines	GW	well graded gravel	*Inorganic*		
Gravel	19-75		4.8-19	little fines	GP	poorly graded gravel	low plast.	ML	silts and very fine sand
Sand	2.0-4.8	.43-2.0	.08-.043	some fines	GM	sand,silt,gravel mix	low plast.	CL	gravelly,sandy,silty clay
Silt & clay			<.08	some fines	GC	sand,clay,gravel,mix	high plast.	MH	micaceous/diatomaceous
Soil density	very loose	loose	med. dense	**Sand**			high plast.	CH	high plasticity clay
	dense	very dense		no fines	SW	well graded gravelly	*Organic*		
Angularity	very ang.	angular	sub angular	little fines	SP	poorly graded gravelly	low plast.	OL	silty clay low plasticity
	sub round	rounded	well round	some fines	SM	silty-sand sandy-silt	high plast.	OH	clay med. to high plasticity
Note - density also in blows/foot above				some fines	SC	sand clay mixture	**Peat**	PT	humus,swamp soils, organic

• Source Unified Soil Classification System

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Geologic Boring Log

Hazardous Waste Mixing Box SWMU 39

Boring ID	Client:	Project:	Location
39-03	Puerto Rico Sun Oil Company	RCRA Facility Investigation	Yabucoa, Puerto Rico
Project No.	**AMAI Geologist/Engineer**	**Driller**	**Drilling Contractor**
	Gustavo Felipe	Constancio Olivo	Jaca & Sierra
Date Started	**Date Completed**	**Drilling Method**	**Sampler type**
6/28/96	6/28/96	3.25" ID - 6.00" OD Hollow Stem	2"x 24" Carbon Steel Split Spoon

Depth bgl (ft)	USCS Symbol	Recovery (per 24")	Blow Counts (per 6")	PID (ppm)	Soil Description (Description made from auger cuttings, unless otherwise noted. (grain size, sorting, moisture, color/hue etc.))
0	SC	24"	2-3-5-15	0.3	**0-18"** Sand and clay mix, Little or no larger sizes, abundant rock fragments and gravel. Backfill zone, very dry, well packed, no visible contamination.
1					18"-24" Black strong hydrocarbon odor.
	Sample collected				Immunoassay sample collected.
2	SM	24"	17-20 17-4	17.4	**2-4 ft** Sand, silt, clay, rock fragments, still backfill zone, Strong hydrocarbon odor, soil appears stained with black tar-like substance.
3					
	Sample collected				Immunoassay sample collected.
4	SM	24"	17-20 17-4	32.9	**4-6 ft** Same as above
10	SC	24"	3-2-3-5	0.3	**10-12 ft** sandy clay sandy clay little gravel no rock fragments. Visual contamination and light hydrocarbon odor.
	Sample collected				Full analysis sample collected.

Soil Descriptions*

Type	Size (mm)			Gravel	Sym		Silt & Clay	Sym	
	Coarse	*Medium*	*Fine*	no fines	GW	well graded gravel	*Inorganic*		
Gravel	19-75		4.8-19	little fines	GP	poorly graded gravel	low plast.	ML	silts and very fine sand
Sand	2.0-4.8	43-2.0	.08-.043	some fines	GM	sand,silt,gravel mix	low plast.	CL	gravelly,sandy,silty clay
Silt & clay			<.08	some fines	GC	sand,clay,gravel,mix	high plast.	MH	micaceous/diatomaceous
Soil density	very loose	loose	med. dense	**Sand**			high plast.	CH	high plasticity clay
	dense	very dense		no fines	SW	well graded gravelly	*Organic*		
Angularity	very ang.	angular	sub angular	little fines	SP	poorly graded gravelly	low plast.	OL	silty clay low plasticity
	sub round	rounded	well round	some fines	SM	silty-sand sandy-silt	high plast.	OH	clay med. to high plasticity
Note - density also in blows/foot above				some fines	SC	sand clay mixture	Peat	PT	humus,swamp soils, organic

* Source Unified Soil Classification System.

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Geologic Boring Log

Disposal Area SWMU 40

Boring ID	Client:	Project:	Location
40-01	Puerto Rico Sun Oil Company	RCRA Facility Investigation	Yabucoa, Puerto Rico
Project No.	**AMAI Geologist/Engineer**	**Driller**	**Drilling Contractor**
	Gustavo Felipe	Constancio Olivo	Jaca & Sierra
Date Started	**Date Completed**	**Drilling Method**	**Sampler type**
6/27/96	6/27/96	3.25" ID - 6.00" OD Hollow Stem Auger	2"x 24" Carbon Steel Split Spoon

Depth bgl (ft.)	USCS Symbol	Recovery (per 24")	Blow Counts (per 6")	PID (ppm)	Soil Description Descriptions made from auger cuttings, unless otherwise noted. (grain size, sorting, moisture, color/hue etc.)
0	GM	24"	14-15	0.0	**0-2 ft** - Sand and gravel, abundant large gravel and rock fragments.
	Sample collected		12-04		Poor sorting loosely compacted. No visible contamination. Dry
1					Hue 10YR 5/4 yellowish brown. Full analysis sample collected
2	GM	24"	6-7-7-2	0.0	**2-4 ft** - Same as above no visible contamination,
	Sample collected				Full analysis sample collected
3					
4	CL			0.0	**4-6 ft** - Silt and clay mix, very plastic. No visible contamination. Some product
5					odor. Dry - Hue 7.5 YR 3/3 Dark brown.
6	CL				**6-11 ft** - Same as above
7					
8					
9					
10					
11	CL	24"	2-2-2-3	0.0	**11-13 ft** - Clay - dense plastic inorganic clay. Red mottles. No visible
12	**Sample collected**				contamination. Saturated at bottom 2" of split spoon. Hue: chart 1 for gley 3/N
13		▼			Dark greenish gray. Full analysis sample collected Augers removed and boring grouted to surface.
14					

Soil Descriptions*

Type	Size (mm)			Gravel	Sym		Silt & Clay	Sym	
	Coarse	*Medium*	*Fine*	no fines	GW	well graded gravel	*Inorganic*		
Gravel	19-75		4.8-19	little fines	GP	poorly graded gravel	low plast.	ML	silts and very fine sand
Sand	2.0-4.8	43-2.0	08-.043	some fines	GM	sand,silt,gravel mix	low plast.	CL	gravelly, sandy, silty clay
Silt & clay			<.08	some fines	GC	sand,clay,gravel,mix	high plast.	MH	micaceous/diatomaceous
Soil density	very loose	loose	med. dense	**Sand**			high plast.	CH	high plasticity clay
	dense	very dense		no fines	SW	well graded gravelly	*Organic*		
Angularity	very ang.	angular	sub angular	little fines	SP	poorly graded gravelly	low plast.	OL	silty clay low plasticity
	sub round	rounded	well round	some fines	SM	silty-sand sandy-silt	high plast.	OH	clay med. to high plasticity
Note - density also in blows/foot above				some fines	SC	sand clay mixture	**Peat**	PT	humus, swamp soils, organic

* Source Unified Soil Classification System.

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Geologic Boring Log

Disposal Area SWMU 40

Boring ID	Client:	Project:	Location
40-02	Puerto Rico Sun Oil Company	RCRA Facility Investigation	Yabucoa, Puerto Rico
Project No.	**AMAI Geologist/Engineer**	**Driller**	**Drilling Contractor**
	Néstor M. Rivera	Constancio Olivo	Jaca & Sierra
Date Started	**Date Completed**	**Drilling Method**	**Sampler type**
6/25/96	6/25/96	3.25" ID - 6.00" OD Hollow Stem Auger	2"x 24" Carbon Steel Split Spoon

Depth bgl (ft.)	USCS Symbol	Recovery (per 24")	Blow Counts (per 6")	PID (ppm)	Soil Description (Description made from auger cuttings, unless otherwise noted. (grain size, sorting, moisture, color/hue etc.))
0	SM	19	8-10	0	**0-2 ft.** Clayey sandy silt. Very hard, slightly moist, yellowish brown (10YR 5/4). Sand composed of quartz, mica, pyrite, and lithic fragments varying in size from fine to coarse. Hydrocarbon odor and staining observed. Full analysis sample collected
	Sample collected		10-10		
1					
2	SP	20	8-7-6-6	0	**2-4 ft.** Clayey gravelly sandy silt. Very hard, slightly moist, yellowish brown (10YR5/4). Sand composed of quartz, mica, pyrite, and lithic fragments varying in size from fine to coarse. Hydrocarbon odor and staining observed. Full analysis sample collected
	Sample collected				
3					
4					From 4 to 12 ft. no sampling was performed.
12	CL	19	2-1-2-3	-	**12-14 ft.** Silty clay. Soft, slightly moist, dark grey (5Y4/1) with red mottles. Iron oxide staining.
13					
14	CL	24	2-2-1-2	0	**14-16 ft.** Silty clay. Soft, slightly moist, dark grey (5Y4/1) with black mottles. Iron oxide staining. Full analysis sample collected
	Sample collected				
15					
16					Boring terminated.

Soil Descriptions*

Type	Size (mm)			Gravel	Sym		Silt & Clay	Sym	
	Coarse	*Medium*	*Fine*	no fines	GW	well graded gravel	*Inorganic*		
Gravel	19-75		4.8-19	little fines	GP	poorly graded gravel	low plast.	ML	silts and very fine sand
Sand	2.0-4.8	43-2.0	.08-.043	some fines	GM	sand,silt,gravel mix	low plast.	CL	gravelly,sandy,silty clay
Silt & clay			<.08	some fines	GC	sand,clay,gravel,mix	high plast.	MH	micaceous/diatomaceous
Soil density	very loose	loose	med. dense	**Sand**			high plast.	CH	high plasticity clay
	dense	very dense		no fines	SW	well graded gravelly	*Organic*		
Angularity	very ang.	angular	sub angular	little fines	SP	poorly graded gravelly	low plast.	OL	silty clay low plasticity
	sub round	rounded	well round	some fines	SM	silty-sand sandy-silt	high plast.	OH	clay med. to high plasticity
Note - density also in blows/foot above				some fines	SC	sand clay mixture	**Peat**	PT	humus,swamp soils, organic

* Source Unified Soil Classification System.

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Geologic Boring Log

Disposal Area SWMU 40

Boring ID	Client:	Project:	Location
40-03	Puerto Rico Sun Oil Company	RCRA Facility Investigation	Yabucoa, Puerto Rico
Project No.	**AMAI Geologist/Engineer**	**Driller**	**Drilling Contractor**
	Néstor M. Rivera	Constancio Olivo	Jaca & Sierra
Date Started	**Date Completed**	**Drilling Method**	**Sampler type**
6/25/96	6/25/96	3.25" ID - 6.00" OD Hollow Stem Auger	2"x 24" Carbon Steel Split Spoon

Depth bgl (ft)	USCS Symbol	Recovery (per 24")	Blow Counts (per 6")	PID (ppm)	Soil Description (Description made from auger cuttings, unless otherwise noted. (grain size, sorting, moisture, color/hue etc.))
0	CL	12	7-7-8-9	0	**0-2 ft.** Gravelly sandy silt. Hard, slightly moist, yellowish brown (10YR5/6). Sand composed of quartz, mica, pyrite and lithic fragments varying in size from fine to coarse. Hydrocarbon odor and staining observed.
1					Full analyses sample collected.
	Sample collected				
2	CL	18	8-10-9-8	313	**2-4 ft.** Gravelly sandy silt. Hard, slightly moist, black (Gley1, 2.5N). Sand composed of quartz, mica, pyrite and lithic fragments varying in size from fine to coarse. Roots and hydrocarbon odor and staining observed.
3	**Sample collected**				Full analyses and Immunoassay sample collected.
4					
	Sample collected				**6-8 ft** Immunoassay sample collected
12	SM, SC	18	3-5-5-5	0	**12-14 ft.** Sand to sandy clay. Loose to stiff, slightly moist to wet, light grey (Gley 1, 7/N). Sand composed of quartz, mica, pyrite and lithic fragments varying in size from fine to coarse. Roots and hydrocarbon odor and staining observed. Full analyses sample collected.
13	**Sample collected**				
14					Boring terminated.

Soil Descriptions*

Type	Size (mm)			Gravel	Sym		Silt & Clay	Sym	
	Coarse	*Medium*	*Fine*	no fines	GW	well graded gravel	*Inorganic*		
Gravel	19-75	[illegible]	4.8-19	little fines	GP	poorly graded gravel	low plast.	ML	silts and very fine sand
Sand	2.0-4.8	43-2.0	.08-.043	some fines	GM	sand,silt,gravel mix	low plast.	CL	gravelly,sandy,silty clay
Silt & clay	[illegible]		< .08	some fines	GC	sand,clay,gravel,mix	high plast.	MH	micaceous/diatomaceous
Soil density	very loose	loose	med. dense	Sand			high plast.	CH	high plasticity clay
	dense	very dense		no fines	SW	well graded gravelly	*Organic*		
Angularity	very ang.	angular	sub angular	little fines	SP	poorly graded gravelly	low plast.	OL	silty clay low plasticity
	sub round	rounded	well round	some fines	SM	silty-sand sandy-silt	high plast.	OH	clay med. to high plasticity
Note - density also in blows/foot above				some fines	SC	sand clay mixture	Peat	PT	humus,swamp soils, organic

* Source Unified Soil Classification System.

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Geologic Boring Log

Disposal Area SWMU 40

Boring ID	Client:	Project:	Location
40-04	Puerto Rico Sun Oil Company	RCRA Facility Investigation	Yabucoa, Puerto Rico
Project No.	**AMAI Geologist/Engineer**	**Driller**	**Drilling Contractor**
	Gustavo Felipe	Constancio Olivo	Jaca & Sierra
Date Started	**Date Completed**	**Drilling Method**	**Sampler type**
6/27/96	6/27/96	3.25" ID - 6.00" OD Hollow Stem Auger	2"x 24" Carbon Steel Split Spoon

Depth bgl (ft.)	USCS Symbol	Recovery (per 24")	Blow Counts (per 6")	PID (ppm)	Soil Description Descriptions made from auger cuttings, unless otherwise noted. (grain size, sorting, moisture, color/hue etc.)
0	GC			0.0	**0-2 ft** - Sand, silt, and little gravel mix, trace rock fragments. Poor sorting. No visible contamination. Very dry Hue 10YR 5/4 yellowish brown.
1					
2	GC			0.0	**2-4 ft** - Same as above.
3					
4	CL			17.0	**4-6 ft** - Silt and clay mix. No visible contaminants. Little product odor Dry - Hue 7.5YR 3/3 Dark brown
5					
6	CL			100.4	**6-8 ft** - Same as above.
7					
8	CL			0.7	**8-10 ft** - Same as above. Darker in color. Hue 5YR 4/2 Olive Gray.
9					
10	CL			0.0	**10-11 ft** - Same as above.
11	CH	24"	3-3-4-7	0.0	**11-13 ft** - Clay - dense high plasticity clay. Red mottles. No visible contamination. Saturated at bottom 3". Hue chart 1 for gley 4/10 Y dark greenish gray. Full analysis sample collected
12	**Sample Collected**				
13		▼			
14					

Soil Descriptions*

Type	Size (mm)			Gravel	Sym		Silt & Clay	Sym	
	Coarse	*Medium*	*Fine*	no fines	GW	well graded gravel	*Inorganic*		
Gravel	19-75		4.8-19	little fines	GP	poorly graded gravel	low plast.	ML	silts and very fine sand
Sand	2.0-4.8	.43-2.0	.08-.043	some fines	GM	sand,silt,gravel mix	low plast.	CL	gravelly,sandy,silty clay
Silt & clay			<.08	some fines	GC	sand,clay,gravel,mix	high plast.	MH	micaceous/diatomaceous
Soil density	very loose	loose	med. dense	Sand			high plast.	CH	high plasticity clay
	dense	very dense		no fines	SW	well graded gravelly	*Organic*		
Angularity	very ang.	angular	sub angular	little fines	SP	poorly graded gravelly	low plast.	OL	silty clay low plasticity
	sub round	rounded	well round	some fines	SM	silty-sand sandy-silt	high plast.	OH	clay med. to high plasticity
Note - density also in blows/foot above				some fines	SC	sand clay mixture	Peat	PT	humus,swamp soils, organic

* Source Unified Soil Classification System.

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Geologic Boring Log

Disposal Area SWMU 40

Boring ID	Client:	Project:	Location
40-05	Puerto Rico Sun Oil Company	RCRA Facility Investigation	Yabucoa, Puerto Rico
Project No.	**AMAI Geologist/Engineer**	**Driller**	**Drilling Contractor**
	Gustavo Felipe	Constancio Olivo	Jaca & Sierra
Date Started	**Date Completed**	**Drilling Method**	**Sampler type**
6/27/96	6/27/96	3.25" ID - 6.00" OD Hollow Stem Auger	2"x 24" Carbon Steel Split Spoon

Depth bgl (ft.)	USCS Symbol	Reco-very (per 24")	Blow Counts (per 6")	PID (ppm)	Soil Description Descriptions made from auger cuttings, unless otherwise noted (grain size, sorting, moisture, color/hue etc.)
0	SM			0	**0-2 ft** - Sandy silt mixture, little or no gravel or rock fragments. No product odor.
1					
2	SM			17.0	**2-4 ft** - Same as above.
3					
4	ML			14.0	**4-6 ft** - Silty clay - very plastic, medium density. No visible contaminants. Strong product odor. Dry Hue 7.5YR 3/3 Dark Brown.
5					
6	ML			0.3	**6-11 ft** - Same as above.
7					
8					
9					
10					
11	CH	24"	2-2-4-1	0.6	**11-13 ft** -Clay - dense high plasticity clay. No visible contamination. Saturated bottom 5" - Hue Chart 1 for gley 4/10 Y dark greenish gray.
12	**Sample collected**				Full analysis sample collected
13					
14					

Soil Descriptions*

Type	Size (mm)			Gravel	Sym		Silt & Clay	Sym	
	Coarse	*Medium*	*Fine*	no fines	GW	well graded gravel	*Inorganic*		
Gravel	19-75		4.8-19	little fines	GP	poorly graded gravel	low plast.	ML	silts and very fine sand
Sand	2.0-4.8	.43-2.0	.08-.043	some fines	GM	sand,silt,gravel mix	low plast.	CL	gravelly,sandy,silty clay
Silt & clay			< 08	some fines	GC	sand,clay,gravel,mix	high plast.	MH	micaceous/diatomaceous
Soil density	very loose	loose	med. dense	**Sand**			high plast.	CH	high plasticity clay
	dense	very dense		no fines	SW	well graded gravelly	*Organic*		
Angularity	very ang.	angular	sub angular	little fines	SP	poorly graded gravelly	low plast.	OL	silty clay low plasticity
	sub round	rounded	well round	some fines	SM	silty-sand sandy-silt	high plast.	OH	clay med. to high plasticity
Note - density also in blows/foot above				some fines	SC	sand clay mixture	**Peat**	PT	humus,swamp soils, organic

* Source Unified Soil Classification System

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Geologic Boring Log

Disposal Area SWMU 40

Boring ID	Client:	Project:	Location
40-06	Puerto Rico Sun Oil Company	RCRA Facility Investigation	Yabucoa, Puerto Rico
Project No.	**AMAI Geologist/Engineer**	**Driller**	**Drilling Contractor**
	Néstor M. Rivera	Constancio Olivo	Jaca & Sierra
Date Started	**Date Completed**	**Drilling Method**	**Sampler type**
6/25/96	6/25/96	3.25" ID - 6.00" OD Hollow Stem Auger	2"x 24" Carbon Steel Split Spoon

Depth bgl (ft.)	USCS Symbol	Recovery (per 24")	Blow Counts (per 6")	PID (ppm)	Soil Description Description made from auger cuttings, unless otherwise noted. (grain size, sorting, moisture, color/hue etc.)
0				19	**0-12 ft.** Drilled without collecting samples. Cuttings was described as: Silty clay to clayey silt. Dark grey to black with biological degradation odor.
12	ML	24	1-1-2-3	0	**12-14 ft.** Clay. Stiff, slightly moist, grey (Gley1, 6/N) with light yellowish brown (2.5Y6/3) mottles.
13					
14	SM	24	3-4-3-4	0	**14-16 ft.** Sand to sandy silty clay. Loose to hard, saturated to slightly moist, light yellowish brown (2.5Y6/3) to grey (Gley1, 6/N). Sand composed of quartz, mica, pyrite,and lithic fragments varying in size from fine to coarse.
	Sample Collected				
15		▼			Full analysis sample collected
16					Boring terminated.

Soil Descriptions*

Type	Size (mm)			Gravel	Sym		Silt & Clay	Sym	
	Coarse	*Medium*	*Fine*	no fines	GW	well graded gravel	*Inorganic*		
Gravel	19-75		4.8-19	little fines	GP	poorly graded gravel	low plast.	ML	silts and very fine sand
Sand	2.0-4.8	.43-2.0	.08-.043	some fines	GM	sand,silt,gravel mix	low plast.	CL	gravelly,sandy,silty clay
Silt & clay			<.08	some fines	GC	sand,clay,gravel,mix	high plast.	MH	micaceous/diatomaceous
Soil density	very loose	loose	med. dense	Sand			high plast.	CH	high plasticity clay
	dense	very dense		no fines	SW	well graded gravelly	*Organic*		
Angularity	very ang.	angular	sub angular	little fines	SP	poorly graded gravelly	low plast.	OL	silty clay low plasticity
	sub round	rounded	well round	some fines	SM	silty-sand sandy-silt	high plast.	OH	clay med. to high plasticity
Note - density also in blows/foot above				some fines	SC	sand clay mixture	Peat	PT	humus,swamp soils, organic

* Source Unified Soil Classification System.

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Geologic Boring Log

Disposal Area SWMU 40

Boring ID	Client:	Project:	Location
40-07	Puerto Rico Sun Oil Company	RCRA Facility Investigation	Yabucoa, Puerto Rico
Project No.	**AMAI Geologist/Engineer**	**Driller**	**Drilling Contractor**
	Gustavo Felipe	Constancio Olivo	Jaca & Sierra
Date Started	**Date Completed**	**Drilling Method**	**Sampler type**
6/25/96	6/25/96	3.25" ID - 6.00" OD Hollow Stem Auger	2"x 24" Carbon Steel Split Spoon

Depth bgl (ft.)	USCS Symbol	Recovery (per 24")	Blow Counts (per 6")	PID (ppm)	Soil Description Descriptions made from auger cuttings, unless otherwise noted. (grain size, sorting, moisture, color/hue etc.)
0	SM			0.7	**0-2 ft** - Silt and clay mixture - trace gravel and rock fragments. Product odor. No visible contaminants. Dry - Hue 7.5YR 3/3 dark brown.
1					
2	SM			0.9	**2-4 ft** - Same as above. Little product odor. Hue 7.5 YR 3/3 dark brown.
3					
4	SM			0.0	**4-8 ft** - Same as above.
5					
6					
7					
8	SP			57.5	**8-10 ft** -Sand and silt, trace rock fragments and gravel. Strong product odor. Visual contaminants. Black tar-like product mixed in cuttings.
9					Hue 5Y 4/2 Olive gray.
10	ML	24"	2-3-2-2	97.3	**10-12 ft** - Same as above.
11					
12	SP	18"	2-3-3-3	98.5	**12-13 ft** - Top of spoon. Well sorted med. sand and silt lens. Visible free product. Moist. Hue 5Y 4/2 Olive gray. Full analysis sample collected
	Sample Collected				
13		▼			**13-14 ft** -Bottom of spoon. Clay dense high plasticity. Visible product contamination. Strong product odor. Hue Chart 1 for gley 4/10 Y Dark greenish gray.
14	CH	24"	4-4-6-7	111.0	**14-16 ft** - Clay - same as above. Visible contamination. Black tar-like product

Soil Descriptions*

Type	Size (mm)			Gravel	Sym		Silt & Clay	Sym	
	Coorse	*Medium*	*Fine*	no fines	GW	well graded gravel	*Inorganic*		
Gravel	19-75		4.8-19	little fines	GP	poorly graded gravel	low plast.	ML	silts and very fine sand
Sand	2.0-4.8	.43-2.0	.08-.043	some fines	GM	sand,silt,gravel mix	low plast.	CL	gravelly,sandy,silty clay
Silt & clay			<.08	some fines	GC	sand,clay,gravel,mix	high plast.	MH	micaceous/diatomaceous
Soil density	very loose	loose	med. dense	**Sand**			high plast.	CH	high plasticity clay
	dense	very dense		no fines	SW	well graded gravelly	*Organic*		
Angularity	very ang.	angular	sub angular	little fines	SP	poorly graded gravelly	low plast.	OL	silty clay low plasticity
	sub round	rounded	well round	some fines	SM	silty-sand sandy-silt	high plast.	OH	clay med. to high plasticity
Note - density also in blows/foot above				some fines	SC	sand clay mixture	**Peat**	PT	humus,swamp soils, organic

* Source Unified Soil Classification System

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Geologic Boring Log

Disposal Area SWMU 40

Boring ID	Client:	Project:	Location
40-08	Puerto Rico Sun Oil Co.	RCRA Facility Investigation	Yabucoa, Puerto Rico
Project No.	**AMAI Geologist/Engineer**	**Driller**	**Drilling Contractor**
	Gustavo Felipe	Constancio Olivo	Jaca & Sierra
Date Started	**Date Completed**	**Drilling Method**	**Sampler type**
6/26/96	6/26/96	3.25" ID - 6.00" OD Hollow Stem	2"x 24" Carbon Steel Split Spoon

Depth bgl (ft.)	USCS Symbol	Recovery (per 24")	Blow Counts (6" each)	PID (ppm)	Soil Description (grain size, sorting, moisture, color/hue etc.)
0	GM			0.4	**0-4 ft** Sand and gravel mix, trace clay and silt, no visible contamination
1					Very dry, Hue 10 YR 5/4 yellowish brown
2					
3					
4	SC			1.9	**4- 6 ft** Sandy silt, trace clay, little or no gravel or rock fragments
5					tar-like product mixed in soil cuttings, strong product odor, Dry,
6	ML			3.9	Hue 7.5 YR 3/3 dark brown
7					**6-10 ft** - Silt and clay, little or no gravel or rock fragments, strong product odor, and tar-like product in cuttings.
8					Hue chart #1 for gley, 2.5 N black
9					
10	ML			0.0	**10-12 ft** Same as above tar-like product mixed in cuttings
11					
12	CH	24"	1-2-4-4	3.7	**12-14 ft** Clay - dense, medium plastcity, inorganic clay (red mottles) throughout, no visible contamination, strong product odor, Saturated at
	Sample collected				15 ft , Hue chart 1 for gley 5/5 GY greenish gray
13					Drill to 22 ft and install temporary monitoring well point
14		▼			Full analysis sample collected.
					End boring

Well Construction Details

Casing material	Screen slot size	Screen Interval	Filter Pack	Cap Type
2"X Schedule 40 PVC	0.020 inch	12-22 ft	No. 2 Silica sand	Watertight cap

Security casing/manhole:	Lock type:
None	None
Notes:	

Well Development Data

Date:	Technique:	Volume purged:
8/8/96	Centrifugal pump using 5/8" high density polyethylene hose.	55 gal

	Temp (°C)	SC (µS/cm)	pH	Notes: SC- specific conductance
Initial:	25	2720	6.01	Water clear after purging
Final:	25	2770	5.89	Well dries at 5 gpm

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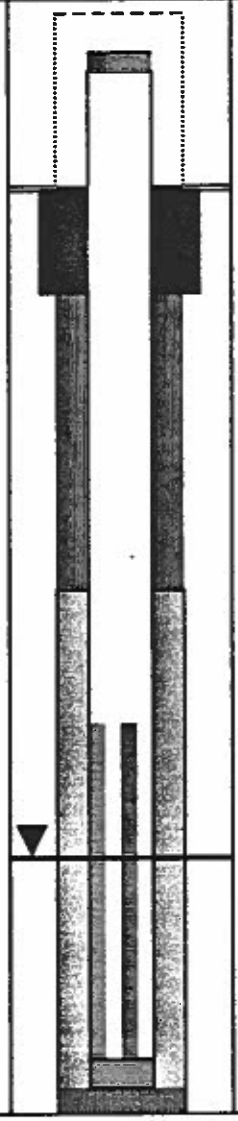
Well Log

Northeast Refinery Area

Well ID:	Client:	Project:	Location:
40-09	Puerto Rico Sun Oil Company	RCRA Facility Investigation	Yabucoa, Puerto Rico
Project No.:	**AMAI Geologist/Engineer:**	**Driller:**	**Drilling contractor:**
	Gustavo Felipe	Constancio Olivo	Jaca & Sierra
Date Started:	**Date Completed:**	**Drilling Method:**	**Fluid:**
6/26/96	6/26/96	3.25" ID-6.0" OD Hollow Stem Auger	None

Depth bgl ft	Well Construction	USCS symbol	Recovery (per 24 ")	Blow Counts (6" ea)	PID (ppm)	Soil Description (Descriptions made from auger cuttings unless otherwise noted (grain size, ** hue/color, moisture, sorting etc.)
0		OL			0.0	0-2 ft Sandy silt little or no gravel, no rock fragments, Organic rich soil. No visible contamination, Dry. Hue 7.5 YR 3/3 Very dark brown
1						
2		OL			3.7	2-4 ft Silt and clay - dense high plasticity. Little or no gravel. strong product odor- visible free product, Dry Hue 7.5 YR 2.5/1 Black
3						
4		OL			7.5	4-6 ft Same as above
5						
6		CH			78.6	6-8 ft Clay dense high plasticity. Little or no gravel, or sand. Visible contamination. Gray Saturated at approximately 8 ft.
7						
8						Drill to 13 ft and install 2" PVC Monitoring well.
9						
10						
11						
12						
13						Auger tip has dense gray clay at tip (13 ft)

Key to well construction

- Standing W.L.
- Land surface
- Security casing
- Bottom of borehole
- End cap
- Bentonite slurry
- Concrete
- Well casing
- Screened interval
- Filter pack

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Well Log (continued)

Northeast Refinery Area

Location	Client:	Project:	Project number
	Puerto Rico Sun Oil Company	RCRA Facility Investigation	

Depth bgl (ft)	USCS Symbol (ppm)	Recovery (per 24")	Blow Counts (6"ea)	PID (ppm)	Soil Description: Descriptions made from auger cuttings unless otherwise noted (grain size, ** hue/color, moisture, sorting etc.)

Well Construction Details

Casing material	Screen slot size	Filter pack	Screen interval	Bottom
2" schedule 40 PVC	0.020 inch	No. 2 Silica Sand	8.0-13.0 ft	Well point

Security casing/manhole:	Lock type:
Above ground 36" galvanized steel protective casing	American

Notes: Watertight cap

Well Development Data

Date:	Technique:	Volume purged:
7/22/96	Centrifugal pump using 5/8" high density polyethylene hose.	40 gallons

	Temp (c)	SC (µS/cm)	pH	Notes: SC- specific conductance
Initial:	25	239	6.44	Pumping rate 1.5 gpm
Final:	25	220	6.49	Viscous black product in well

*Soil Descriptions

Type	Size (mm)			Gravel	Sym		Silt & Clay	Sym	
	Coarse	*Medium*	*Fine*	no fines	GW	well graded gravel	*Inorganic*		
Gravel	19-75		4.8-19	little fines	GP	poorly graded gravel	low plast.	ML	silts and very fine sand
Sand	2.0-4.8	.43-2.0	.08-.043	some fines	GM	sand,silt,gravel mix	low plast.	CL	gravelly,sandy,silty clay
Silt & clay			<.08	some fines	GC	sand,clay,gravel,mix	high plast.	MH	micaceous/diatomaceous
Soil density	very loose	loose	med. dense	Sand			high plast.	CH	high plasticity clay
	dense	very dense		no fines	SW	well graded gravelly	*Organic*		
Angularity	very ang.	angular	sub angular	little fines	SP	poorly graded gravelly	low plast	OL	silty clay low plasticity
	sub round	rounded	well round	some fines	SM	silty-sand sandy-silt	high plast.	OH	clay med. to high plasticity
Note - density also in blows/foot above				some fines	SC	sand clay mixture	Peat	PT	humus,swamp soils, organic

* Source Unified Soil Classification System ** Hue and color based on MUNSELL Soil color charts

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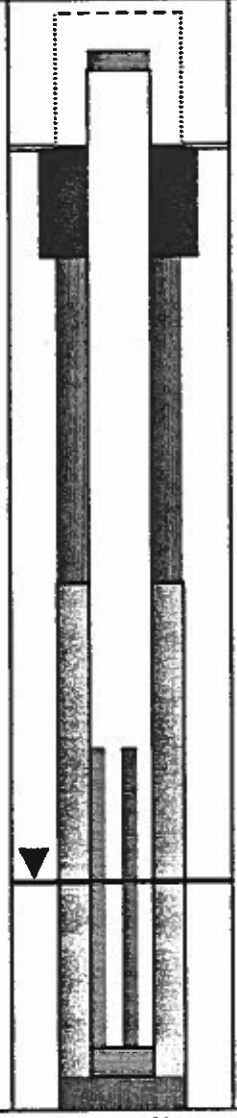
Well Log

Northeast Refinery Area

Well ID:	Client:	Project:	Location:
40-10	Puerto Rico Sun Oil Company	RCRA Facility Investigation	Yabucoa, Puerto Rico
Project No.:	**AMAI Geologist/Engineer:**	**Driller:**	**Drilling contractor:**
	Gustavo Felipe	Constancio Olivo	Jaca & Sierra
Date Started:	**Date Completed:**	**Drilling Method:**	**Fluid:**
6/27/96	6/27/96	3.25" ID-6.0" OD Hollow Stem Auger	None

Depth bgl ft	Well Construction	USCS symbol	Recovery (per 24 ")	Blow Counts (6" ea)	PID (ppm)	Soil Description (Descriptions made from auger cuttings unless otherwise noted (grain size, ** hue/color, moisture, sorting etc.)
0		SM			0.0	**0-2 ft** Sandy silt little or no gravel, no rock fragments, Organic rich soil. No visible contamination, Dry. Hue 7.5 YR 3/3 Very dark brown
2		SM			0.0	**2-3 ft** Same as above
3						**3-4 ft** Same grain size as above color change at 3 ft perhaps due to product in soil. Dry Hue 7.5 YR 2.5/1 Black
4		ML			78.9	**4-6 ft** Fine sand and silt mix, little or no gravel, visible free product in soil. Saturated at 6 ft bgl, Hue 7.5 YR 2.5/1 Black
6		CH			78.6	**6-14 ft** Drill to 14 ft and install 2" PVC monitoring well 40-10.
8						Clay appears in cuttings at approximately 8 ft bgl.
13						Auger tip has dense gray clay at tip (13 ft)
14						

Key to well construction

- Standing W.L.
- Land surface
- Security casing
- Bottom of borehole
- End cap
- Bentonite slurry
- Concrete
- Well casing
- Screened interval
- Filter pack

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Well Log (continued)

Northeast Refinery Area

Location	Client:	Project:	Project number
Yabucoa, P.R.	Puerto Rico Sun Oil Company	RCRA Facility Investigation	

Depth bgl (ft)	USCS Symbol (ppm)	Reco-very (per 24")	Blow Counts (6"ea)	PID (ppm)	Soil Description Descriptions made from auger cuttings unless otherwise noted (grain size, ** hue/color, moisture, sorting etc.)

Well Construction Details

Casing material	Screen slot size	Filter pack	Screen Interval	Bottom
2" schedule 40 PVC	0.020 inch	No. 2 Silica Sand	9.0-14.0 ft	Well point

Security casing/manhole:	Lock type:
Above ground 36" galvanized steel protective casing	American keyed-alike (aluminum body)

Notes: Watertight cap

Well Development Data

Date:	Technique:	Volume purged:
7/22/96	Centrifugal pump using 5/8" high density polyethylene hose.	35 gallons

	Temp (c)	SC (µS/cm)	pH	Notes: SC- specific conductance
Initial:	25	1600	5.33	Pumping rate 1.0 gpm
Final:	25	1640	5.31	Viscous black product in well

*Soil Descriptions

Type	Size (mm)			Gravel	Sym		Silt & Clay	Sym	
	Coarse	*Medium*	*Fine*	no fines	GW	well graded gravel	*Inorganic*		
Gravel	19-75		4.8-19	little fines	GP	poorly graded gravel	low plast.	ML	silts and very fine sand
Sand	2.0-4.8	.43-2.0	.08-.043	some fines	GM	sand,silt,gravel mix	low plast.	CL	gravelly,sandy,silty clay
Silt & clay			<.08	some fines	GC	sand,clay,gravel,mix	high plast.	MH	micaceous/diatomaceous
Soil density	very loose	loose	med. dense	Sand			high plast.	CH	high plasticity clay
	dense	very dense		no fines	SW	well graded gravelly	*Organic*		
Angularity	very ang.	angular	sub angular	little fines	SP	poorly graded gravelly	low plast.	OL	silty clay low plasticity
	sub round	rounded	well round	some fines	SM	silty-sand sandy-silt	high plast.	OH	clay med. to high plasticity
Note - density also in blows/foot above				some fines	SC	sand clay mixture	Peat	PT	humus,swamp soils, organic

* Source Unified Soil Classification System. **Hue and color based on MUNSELL Soil color charts

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Geologic Boring Log

Northeast Refinery Area

Boring ID	Client:	Project:	Location
40-11	Puerto Rico Sun Oil Co.	RCRA Facility Investigation	Yabucoa, Puerto Rico
Project No.	**AMAI Geologist/Engineer**	**Driller**	**Drilling Contractor**
	Nestor Rivera	Constancio Olivo	Jaca & Sierra
Date Started	**Date Completed**	**Drilling Method**	**Sampler type**
7/18/96	7/18/96	3.25" ID - 6.00" OD Hollow Stem	2"x 24" Carbon Steel Split Spoon

Depth bgl (ft)	USCS Symbol	Recovery (per 24")	Blow Counts (6" each)	PID (ppm)	Soil Description (grain size, sorting, moisture, color/hue etc.)
0	CL	8"	2-3-4-5	0	**0-2 ft** Sandy silt, stiff slightly moist, fine to coarse quartz, mica, pyrite, and lithic sand, no stains no odor, roots and lignite fragments observed
1					Hue 10 YR 4/4 dark yellowish brown
2	CL	16"	3-3-5-4	0	**2-4 ft** Same as above, some rock fragments observed
3					
4	CL	18"	3-4-4-4	0	**4-6 ft** Same as above (top 12")
5					Bottom (6") Black staining, has hydrocarbon odor, Hue #1 for gley 2.5/1 10 GY greenish black and #1 for gley 2.5/N Black
6	SM	18"	3-3-3-2	0	**6-8 ft** Silty sand, fine to coarse grained mica, pyrite, and lithic sand,
7		▼			(mostly fine) visible product in soil, hydrocarbon odor, moist, loose roots Hue #1 for gley 2.5/N black
8	SM	12"	1-2-2-1	0	**8-10 ft** same as above, wet to saturated
9					Drill to 18 ft bgl and install temporary monitoring well point
18					18 ft End boring

Well Construction Details

Casing material	Screen slot size	Screen Interval	Filter Pack	Cap Type
2"X Schedule 40 PVC	0.020 inch	8-18 ft	No. 2 Silica sand	Watertight

Security casing/manhole:	Lock type:
36" standing galvanized steel casing	American

Notes: Filter pack 6-18 ft bgl - Grout 2-6 ft bgl - concrete 0-2 ft bgl

Well Development Data

Date:	Technique:	Volume purged:
7/22/96	Centrifugal pump using 5/8" high density polyethylene hose.	55 gal

	Temp (°C)	SC (µS/cm)	pH	Notes: SC- specific conductance
Initial:	25	2220	6.80	Yield approximately .5 gpm
Final:	25	2280	6.83	Free product in water

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Geologic Boring Log

Northeast Refinery Area

Boring ID	Client:	Project:	Location
40-12	Puerto Rico Sun Oil Co.	RCRA Facility Investigation	Yabucoa, Puerto Rico
Project No.	**AMAI Geologist/Engineer**	**Driller**	**Drilling Contractor**
	Nestor Rivera	Constancio Olivo	Jaca & Sierra
Date Started	**Date Completed**	**Drilling Method**	**Sampler type**
7/18/96	7/18/96	3.25" ID - 6.00" OD Hollow Stem	2"x 24" Carbon Steel Split Spoon

Depth bgl (ft)	USCS Symbol	Recovery (per 24")	Blow Counts (6" each)	PID (ppm)	Soil Description (grain size, sorting, moisture, color/hue etc.)
0	CL	18"	3-3-3-4	0	**0-2 ft** Sandy silt, slightly moist, stiff, fine to coarse quartz, mica, pyrite and lithic sand, roots, no stains no odor, Hue 10 YR 4/4 dark yellowish brown
1					
2	CL	20"	-5-6-13	0	**2-4 ft** Same as above, some lignite fragments observed
3					
4	SM	10"	8-8 10-13	0	**4-6 ft** Silty sand slightly moist medium fine to coarse quartz mica, pyrite, and lithic sand, lignite fragments observed, no stains no odor Hue 10 YR 4/4 dark yellowish brown.
5					
6	SM	24" ▼	4-4-5-3	0	**6-8 ft** Same as above with red mottles (mottles hue 7.5 R 3/4 dusky red)
7					
8	SM	18"	3-4-3-5	0	**8-10 ft** Sandy silt, slightly moist, soft, Bottom 6" has hydrocarbon odor and product staining, roots, fine to medium greenish quartz, mica pyrite and lithic sand, Hue 10 YR 4/3 brown, and 5Y 3/N very dark gray
9					
10	SM	18"	3-4-3-5	0	**10-12 ft** Silty sand to sand, wet, some free product observed has hydrocarbon odor, fine to coarse quartz, mica, pyrite, and lithic sand Hue #1 for gley 3/N very dark gray.
11					
12	SM	10"	1-1-1-2	0	**12-14 ft** Sand to silty sand, saturated, loose, visible product and hydrocarbon odor, Hue #1 for gley 4/1 10Y
13					Bottom of spoon - Silty clay soft wet, no stains no odor. Hue #1 for gley 3/1 5GY dark greenish gray
14					Collect physiochemical analysis sample, Install temporary monitoring point at 15 ft bgl

Well Construction Details

Casing material	Screen slot size	Screen Interval	Filter Pack	Cap Type
2" Schedule 40 PVC	0.020 inch	5-15 ft	No. 2 Silica sand	Watertight cap

Security casing/manhole:	Lock type:
36" standing galvanized steel casing	American

Notes: Filter pack 5-15 ft bgl - Grout 2-5 ft bgl - concrete 0-2 ft bgl

Well Development Data

Date:	Technique:	Volume purged:
7/22/96	Centrifugal pump using 5/8" high density polyethylene hose.	30 gallons

	Temp (°C)	SC (µS/cm)	pH	Notes: SC- specific conductance
Initial:	25	940	6.60	Yield approximately .5 gpm
Final:	25	890	6.44	Free product in water

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Geologic Boring Log

Northeast Refinery Area

Boring ID	Client:	Project:	Location
40-13	Puerto Rico Sun Oil Co.	RCRA Facility Investigation	Yabucoa, Puerto Rico
Project No.	**AMAI Geologist/Engineer**	**Driller**	**Drilling Contractor**
	Nestor M. Rivera	Constancio Olivo	Jaca & Sierra
Date Started	**Date Completed**	**Drilling Method**	**Sampler type**
7/19/96	7/19/96	3.25" ID - 6.00" OD Hollow Stem	2"x 24" Carbon Steel Split Spoon

Depth bgl (ft)	USCS Symbol	Recovery (per 24")	Blow Counts (6" each)	PID (ppm)	Soil Description (grain size, sorting, moisture, color/hue etc.)
0	CL	18"	1-2-3-4	0	**0-2 ft** Sandy silt, slightly moist, stiff, fine to coarse quartz, mica, pyrite, and lithic sand, no stains no odor, roots Hue 10 YR 4/4 dark yellowish brown
1					
2	CL	20"	2-2-4-4	0	**2-4 ft** Silty clay, stiff and slightly moist, roots and lignite No stains no odor Hue 7.5 YR 4/4 brown
3					
4	CL	24"	4-5-5-5	0	**4-6 ft** Silty clay, stiff and slightly moist, oil stains on roots and in void spaces Hue #1 for gley 5/N gray and 3/1 5GY dark greenish gray
5					
6	CL	24"	4-5-5-5	0	**6-8 ft** Same as above firm sandy clay lens 7-7.5 bgl (wet)
7					
8	CL	24"	2-1-2-3	0	**8-10 ft** Same as above, sandy layers within a clay matrix, which have visible free product, sand is wet
9					
10	CL/SP	20"	3-3-3-4	0	**10-12 ft** Sand to sandy clay, fine to coarse quartz, mica, pyrite and lithic sand loose to soft, moist to wet, visible free product in sand and sandy clay
11					
12	CL	18"	1-1-1-4	0	**12-14 ft** Sandy clay, soft moist to wet, visible free product in sand and sandy clay Fine to coarse quartz, mica, pyrite, and lithic sand Hue #1 for gley 5/N gray and 3/1 5 GY dark greenish gray
13					

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Geologic Boring Log

(Continued) Page 2 of 2 **Northeast Refinery Area**

Boring ID	Client:	Project:	Location
40-13	Puerto Rico Sun Oil Co.	RCRA Facility Investigation	Yabucoa, Puerto Rico
Project No.	**AMAI Geologist/Engineer**	**Driller**	**Drilling Contractor**
	Nestor M. Rivera	Constancio Olivo	Jaca & Sierra
Date Started	**Date Completed**	**Drilling Method**	**Sampler type**
7/19/96	7/19/96	3.25" ID - 6.00" OD Hollow Stem	2"x 24" Carbon Steel Split Spoon

Depth bgl (ft.)	USCS Symbol	Recovery (per 24")	Blow Counts (6" each)	PID (ppm)	Soil Description (grain size, sorting, moisture, color/hue etc.)
14	CL/SP	21"	3-5-4-5	0	**14-16 ft** Visible product in sand, slight hydrocarbon odor in clay, Fine to coarse quartz and mica, pyrite and lithic sand Hue #1 for gley 5/N and 5/1 5GY dark greenish gray
15					
16	CL/SP	24"	4-7-6-5	0	**16-18 ft** Same as above
17					
18	CL/SP	24"	2-3-3-3	0	**18-20 ft** Same as above
19					Install temporary monitoring well point at 18 ft bgl Screen 8-18 ft
20					

Well Construction Details

Casing material	Screen slot size	Screen Interval	Filter Pack	Cap Type
2" Schedule 40 PVC	0.020 inch	8-18 ft	No. 2 Silica sand	Watertight cap

Security casing/manhole:	Lock type:
36" standing galvanized steel casing	American

Notes: Filter pack 6-18 ft bgl - Grout 2-6 ft bgl - concrete 0-2 ft bgl

Well Development Data

Date:	Technique:	Volume purged:
7/19/96	Centrifugal pump using 5/8" high density polyethylene hose.	55 gallons

	Temp (c)	SC (µS/cm)	pH	Notes: SC- specific conductance
Initial:	25	1200	6.07	Hydrocarbon odor in purge water
Final:	25	1190	6.16	

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Geologic Boring Log

* Well installed 1 ft from boring 14a

Northeast Refinery Area

Boring ID	Client:	Project:	Location
40-14	Puerto Rico Sun Oil Co.	RCRA Facility Investigation	Yabucoa, Puerto Rico
Project No.	**AMAI Geologist/Engineer**	**Driller**	**Drilling Contractor**
	Nestor M. Rivera	Constancio Olivo	Jaca & Sierra
Date Started	**Date Completed**	**Drilling Method**	**Sampler type**
7/29/96	7/29/96	3.25" ID-6.00" OD Hollow Stem Auger	2"x 24" Carbon Steel Split Spoon

Depth bgl (ft)	USCS Symbol	Recovery (per 24")	Blow Counts (6" each)	PID (ppm)	Soil Description (grain size, sorting, moisture, color/hue etc.)
0-12	-	- ▼	-		**0-12 ft** Soil as described in boring 40-14a
12	CL	15"	1-2-2-3	0	**12-14 ft** Clay to sandy clay, slightly moist, soft, locally has fine to medium size sand, composed of quartz, mica, and lithic fragments, no stains, no odor Hue 10 YR 4/4 brown and #1 for gley 6/n gray
13					
14	CL	21"	2-2-2-2	0	**14-16 ft** Clay to sandy clay, slightly moist, soft, locally sandier, sand consists of Quartz, Mica, Pyrite, and lithic fragments, ranging in size from fine to medium grained, Hue 1 for gley 6/N gray, and Chart #1 for gley 4/Ndark gray
15					
16	CL	N/R	3-3-4-4	0	**16-18 ft** Sandy clay, slightly moist, soft, reddish yellow (7.5 YR 7/8) mottles locally sandier, sand composed of Quartz, mica, pyrite, and lithic fragments, ranging in size from fine to coarse grained, Hue chart #1 for gley 6/N gray to brown 7.5YR 4/3
17					
18					End boring and install temporary monitoring well point at 18 ft screen 8-18 ft
19					
20					

Well Construction Details

Casing material	Screen slot size	Screen Interval	Filter Pack	Cap Type
2" Schedule 40 PVC	0.020 inch	8-18 ft	No. 2 Silica sand	Watertight cap

Security casing/manhole:	Lock type:
36 " standing galvanized steel casing	American

Notes:

Well Development Data

Date:	Technique:	Volume purged:
8/19/96	Centrifugal pump using 5/8" high density polyethylene hose.	20 gallons

	Temp (c)	SC (µS/cm)	pH	Notes: SC- specific conductance
Initial:	26.1	670	6.19	
Final:	25.0	580	6.03	

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Geologic Boring Log

Northeast Refinery Area

Boring ID	Client:	Project:	Location
40-14a	Puerto Rico Sun Oil Company	RCRA Facility Investigation	Yabucoa, Puerto Rico
Project No.	**AMAI Geologist/Engineer**	**Driller**	**Drilling Contractor**
	Nestor M. Rivera	Constancio Olivo	Jaca & Sierra
Date Started	**Date Completed**	**Drilling Method**	**Sampler type**
7/19/96	7/19/96	Tripod	2"x 18"/24" Carb Steel Split Spoon

Depth bgl (ft)	USCS Symbol	Recovery (per 24")	Blow Counts (per 6")	PID (ppm)	Soil Description Descriptions made from auger cuttings, unless otherwise noted. (grain size, sorting, moisture, color/hue etc)
0	CL	14"	2-2-4-5	0	**0-2 ft** - Sandy silt, stiff, slightly moist, fine to coarse quartz, mica, pyrite, sand, Roots, no stains no odor,
1					Hue 10 YR 3/5 dark yellowish brown
2	CL	14"	2-3-4-5	0	**2-4 ft** - Same as above with red mottles of Iron Oxide
3					Hue 7.5 YR 3/4 dark brown
4	CL	18"	3-3-5-5	0	**4-6 ft** -Same as above (2-4 ft)
5					
6	CL/SP	24"	6-3-2-3	0	**6-8 ft** - Sandy clay, soft to stiff, slightly moist to moist, locally sand layers are observed, fine to coarse quartz, mica, pyrite, and lithic fragments,
	Sample collected				
7		▼			no stains no odor, Hue #1 for gley 5/N gray and 3/1 5GY dark greenish gray Immunoassay sample collected
8	SC	8"	5-4-4-7	0	**8-10 ft** - Clayey sand to sand, loose wet to saturated, fine to coarse quartz mica, pyrite, and lithic sand, no stains no odor roots, Black mottles
9					Hue 5Y 5/N gray (mottles gley #1 2.5/N black)
					End boring , grout to surface

Soil Descriptions*

Type	Size (mm)			Gravel	Sym		Silt & Clay	Sym	
	Coarse	*Medium*	*Fine*	no fines	GW	well graded gravel	*Inorganic*		
Gravel	19-75		4.8-19	little fines	GP	poorly graded gravel	low plast.	ML	silts and very fine sand
Sand	2.0-4.8	.43-2 0	.08-.043	some fines	GM	sand,silt,gravel mix	low plast.	CL	gravelly, sandy, silty clay
Silt & clay			<.08	some fines	GC	sand,clay,gravel,mix	high plast.	MH	micaceous/diatomaceous
Soil density	very loose	loose	med. dense	**Sand**			high plast.	CH	high plasticity clay
	dense	very dense		no fines	SW	well graded gravelly	*Organic*		
Angularity	very ang.	angular	sub angular	little fines	SP	poorly graded gravelly	low plast.	OL	silty clay low plasticity
	sub round	rounded	well round	some fines	SM	silty-sand sandy-silt	high plast.	OH	clay med. to high plasticity
Note - density also in blows/foot above				some fines	SC	sand clay mixture	**Peat**	PT	humus, swamp soils, organic

* Source Unified Soil Classification System.

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Geologic Boring Log

Northeast Refinery Area

Boring ID	Client:	Project:	Location
40-14b	Puerto Rico Sun Oil Company	RCRA Facility Investigation	Yabucoa, Puerto Rico
Project No.	**AMAI Geologist/Engineer**	**Driller**	**Drilling Contractor**
	Nestor M. Rivera	Constancio Olivo	Jaca & Sierra
Date Started	**Date Completed**	**Drilling Method**	**Sampler type**
7/19/96	7/19/96	Tripod	2"x 18"/24" Carb Steel Split Spoon

Depth bgl (ft)	USCS Symbol	Recovery (per 24")	Blow Counts (per 6")	PID (ppm)	Soil Description Descriptions made from auger cuttings, unless otherwise noted. (grain size, sorting, moisture, color/hue etc.)
0	CL	16"	2-2-4-5	0	**0-2 ft** Sandy silt, stiff slightly moist, fine to coarse grained sand quartz, mica, pyrite, and lithic fragments, no stains no odor, roots
1					Hue 10 YR 4/4 dark yellowish brown
2	CL	16"	8-8-9-11	0	**2-4 ft** Sandy silt, stiff slightly moist fine to coarse, grained quartz,
3					Mica, pyrite, and lithic sand, no stains, no odor, some roots
4	CL	18"	5-6-4-6	0	Hue 10 YR dark yellowish brown **4-6 ft** Same as above, with dark red mottles of Iron Oxide stains,
5					(mottles hue 7.5 R 3/4)
6	CL	22"	6-6-6-7	0	**6-8 ft** Same as above with dark red mottles (hue 7.5 R 3/4)
7					Fine to coarse Quartz, mica, pyrite, and lithic sand (2") layer found at 7' 6" bgl
8			8-6-5-5		**8-10 ft** No recovery
	Sample collected				Immunoassay sample collected
9		▼			
10	SP	24"		0	**10-12 ft**
11	MH				Top of spoon (8") - Silty sand fine to coarse, quartz, mica, pyrite and lithic sand No stains, no product odor, loose, wet, roots in sample, Hue 10 YR 4/3 brown
12	SP				Middle of spoon (8") - Clay to sandy clay, soft slightly moist, roots Hue #1 for gley 3/1 5GY dark greenish gray
					Bottom of spoon (8") - Sand, wet, loose, fine to coarse quartz, mica pyrite and lithic sand, no stains, no odor, Hue 5Y 5/N gray
					End boring, grout to surface

Soil Descriptions*

Type	Size (mm)			Gravel	Sym		Silt & Clay	Sym	
	Coarse	*Medium*	*Fine*	no fines	GW	well graded gravel	*Inorganic*		
Gravel	19-75	[illegible]	4.8-19	little fines	GP	poorly graded gravel	low plast.	ML	silts and very fine sand
Sand	2.0-4.8	43-2.0	.08-.043	some fines	GM	sand,silt,gravel mix	low plast.	CL	gravelly, sandy, silty clay
Silt & clay	[illegible]	[illegible]	<.08	some fines	GC	sand,clay,gravel,mix	high plast.	MH	micaceous/diatomaceous
Soil density	very loose	loose	med. dense	**Sand**			high plast.	CH	high plasticity clay
	dense	very dense		no fines	SW	well graded gravelly	*Organic*		
Angularity	very ang.	angular	sub angular	little fines	SP	poorly graded gravelly	low plast.	OL	silty clay low plasticity
	sub round	rounded	well round	some fines	SM	silty-sand sandy-silt	high plast.	OH	clay med. to high plasticity
Note - density also in blows/foot above				some fines	SC	sand clay mixture	**Peat**	PT	humus, swamp soils, organic

* Source Unified Soil Classification System.

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Geologic Boring Log

* Well installed 1 ft from boring 15a

Northeast Refinery Area

Boring ID	Client:	Project:	Location
40-15	Puerto Rico Sun Oil Co.	RCRA Facility Investigation	Yabucoa, Puerto Rico
Project No.	**AMAI Geologist/Engineer**	**Driller**	**Drilling Contractor**
	Nestor M. Rivera	Constancio Olivo	Jaca & Sierra
Date Started	**Date Completed**	**Drilling Method**	**Sampler type**
7/29/96	7/29/96	3.25" ID-6.0" OD Hollow Stem Auger	2"x 24" Carbon Steel Split Spoon

Depth bgl (ft)	USCS Symbol	Recovery (per 24")	Blow Counts (6" each)	PID (ppm)	Soil Description (grain size, sorting, moisture, color/hue etc.)
0-14	-	- ▼	-	-	**0-14 ft** Soil as described in boring 40-15a
14	SP/CL	23"	2-2-3-3	0	**14-16 ft** Top (6") Sand, poorly sorted, loose, saturated , composed of quartz, mica, pyrite and lithic fragments, varying in size from fine to very coarse, visible product, Hue 10 YR 2/1 black
15					Middle (13") Clay, soft moist, free product in void spaces, Hue #1 gley 4/1 10 GY Greenish gray Bottom (4") Sandy clay, soft moist, hydrocarbon odor, Hue #1 gley 3/N Very dark gray
16	SP/CL	24"	2-3-2-3	0	**16-18 ft** Top (18") Sand poorly sorted, loose, moist to wet, visible product Hue 10 YR 4/1 dark gray Bottom (6") Clay to sandy clay, soft slightly moist to moist, sand varies in size from fine to coarse, composed of quartz, mica, pyrite and lithic fragments
17					
18					End boring and install temporary monitoring well point at 18 ft screen 8-18 ft bgl
19					

Well Construction Details

Casing material	Screen slot size	Screen Interval	Filter Pack	Cap Type
2" Schedule 40 PVC	0.020 inch	8-18 ft	No. 2 Silica sand	Watertight cap

Security casing/manhole:	Lock type:
36 " standing galvanized steel casing	American

Notes:

Well Development Data

Date:	Technique:	Volume purged:
8/19/96	Centrifugal pump using 5/8" high density polyethylene hose.	15 gallons

	Temp (c)	SC (µS/cm)	pH	Notes: SC- specific conductance
Initial:	-	-	-	
Final:	-	-	-	

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Geologic Boring Log

Northeast Refinery Area

Boring ID	Client:	Project:	Location
40-15a	Puerto Rico Sun Oil Company	RCRA Facility Investigation	Yabucoa, Puerto Rico
Project No.	**AMAI Geologist/Engineer**	**Driller**	**Drilling Contractor**
	Nestor M. Rivera	Mario Sierra	Jaca & Sierra
Date Started	**Date Completed**	**Drilling Method**	**Sampler type**
7/22/96	7/22/96	Tripod	2"x 18"/24" Carb Steel Split Spoon

Depth bgl (ft)	USCS Symbol	Reco-very (per 24")	Blow Counts (per 6")	PID (ppm)	Soil Description Descriptions made from auger cuttings, unless otherwise noted. (grain size, sorting, moisture, color/hue etc.)
0	SP	10"	3-2-1-2-	0	**0-2 ft** - Sand. fine to very coarse, Quartz, mica, pyrite, lithic, slightly moist, loose, no visible contamination, Hue 7.5 YR 5/4 brown,
1					
2	SP	16"	3-2-5-6	0	**2-4 ft** - Sand, slightly moist, loose, fine to very coarse, Quartz mica,pyrite, and lithic sand last 6" are siltier with roots
3					Hue 10 YR 5/6 yellowish brown
4	SM	18"	6-6-6-5	0	**4-6 ft** - Sand to silty sand, loose to dense, slightly moist, fine to coarse quartz, Mica, pyrite and lithic sand, last 6 " is sandy clay,
5					Hue 10 YR 3/4 yellowish brown, No stains no odor.
6	SC	8"	6-6-5-6	0	**6-8 ft** - Sandy clay, fine to coarse quartz , mica, pyrite, lithic sand, slightly moist, stiff, no stains no odor,
7					Hue 10 YR 3/4 dark yellowish brown to 7.5 YR 4/4 brown
8	SC	8"	5-4-4-7	0	**8-10 ft** - Sandy clay, fine to coarse, quartz, mica, pyrite, lithic sand, roots fine sand and layering, no stains, no odor, stiff, slightly moist to moist,
9					Hue 10 YR 3/4 dark yellowish brown.
10	SC	14"	3-4-4-6	0	**10-12 ft** - Sandy clay, fine to coarse, quartz, mica, pyrite, lithic sand, roots Black staining and odor, fine to coarse, quartz et al.
11					Hue 10 YR 3/4 dark yellowish brown.
12		16"	6-6-6-6	0	12-14 ft - Top of spoon (3") - sandy clay, soft to stiff, slightly moist to moist Oil stains in void spaces. Hue #1 for gley 5/n gray and 5/1 5GY dark gr. gray
13		▼			Middle of spoon (4") - Fine to coarse sand, quartz, mica, pyrite, and lithic sand, soil is wet and has visible free product,
14					Bottom of spoon (9") - same as above, sandy clay on top End boring, grout to surface.

Soil Descriptions*

Type	Size (mm)			Gravel	Sym		Silt & Clay	Sym	
	Coarse	*Medium*	*Fine*	no fines	GW	well graded gravel	*Inorganic*		
Gravel	19-75		4.8-19	little fines	GP	poorly graded gravel	low plast.	ML	silts and very fine sand
Sand	2.0-4.8	43-2.0	.08-.043	some fines	GM	sand,silt,gravel mix	low plast.	CL	gravelly, sandy, silty clay
Silt & clay			<.08	some fines	GC	sand,clay,gravel,mix	high plast.	MH	micaceous/diatomaceous
Soil density	very loose	loose	med. dense	**Sand**			high plast.	CH	high plasticity clay
	dense	very dense		no fines	SW	well graded gravelly	*Organic*		
Angularity	very ang.	angular	sub angular	little fines	SP	poorly graded gravelly	low plast.	OL	silty clay low plasticity
	sub round	rounded	well round	some fines	SM	silty-sand sandy-silt	high plast.	OH	clay med. to high plasticity
Note - density also in blows/foot above				some fines	SC	sand clay mixture	**Peat**	PT	humus, swamp soils, organic

* Source Unified Soil Classification System

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Geologic Boring Log

Northeast Refinery Area

Boring ID	Client:	Project:	Location
40-16	Puerto Rico Sun Oil Co.	RCRA Facility Investigation	Yabucoa, Puerto Rico
Project No.	**AMAI Geologist/Engineer**	**Driller**	**Drilling Contractor**
	Néstor M. Rivera	Constancio Olivo	Jaca & Sierra
Date Started	**Date Completed**	**Drilling Method**	**Sampler type**
7/30/96	7/30/96	3.25" ID-6.0" OD Hollow Stem Auger	2"x 24" Carbon Steel Split Spoon

Depth bgl (ft)	USCS Symbol	Recovery (per 24")	Blow Counts (6" each)	PID (ppm)	Soil Description (grain size, sorting, moisture, color/hue etc.)
0	SM	24	1-2-3-3	-	**0-2 ft.** Sandy silt. Soft, slightly moist to wet, yellowish brown (10YR5/4) Sand composed of quartz, mica, pyrite and lithic fragments varying in size from fine to coarse. Roots and lignite observed.
1					
2	SC, S	24	4-4-5-6	-	**2-4 ft.** Clay to sandy clay. Soft to stiff, slightly moist, gray (7.5YR5/1) to strong brown (7.5YR5/6). Sand composed of quartz, mica, pyrite and lithic fragments varying in size from fine to coarse.
3					
4	SC, S	24	6-7-5-4	-	**4-6 ft.** Sandy clay to sand. Soft to stiff to loose, slightly moist to wet, gray (Gley 1, 5/N) to black (7.5YR2.5/1) to dark brown (7.5YR3/4). Sand composed of quartz, mica, pyrite and lithic fragments varying in size from fine to coarse. Hydrocarbon odor and visible product.
5					
6	SC, S	18	4-3-4-3	-	**6-8 ft.** Sandy clay to sand. Stiff to loose, slightly moist, dark gray (Gley 1,4/N). Sand composed of quartz, mica, pyrite and lithic fragments varying in size from fine to coarse. Hydrocarbon odor and visible product.
7		▼			
8	SC, S	24	1-1-2-2	-	**8-10 ft.** Sandy clay to sand. Soft to loose, moist to wet, black (Gley 1, 4/N) to greenish gray (Gley 1, 5/1,5G). Sand composed of quartz, mica, pyrite and lithic fragments varying in size from fine to coarse. Hydrocarbon odor and visible product.
9					
10	SC,SM	24	1-1-1-2	-	**10-12 ft.** Sandy clay to sand. Soft to loose, wet, grey (Gley 1, 5/N) to greenish gray (Gley 1, 5/N). Sand composed of quartz, mica, pyrite and lithic fragments varying in size from fine to coarse. Hydrocarbon odor and visible product.
11					
12	SC, S	24	2-2-2-2	-	**12-14 ft.** Same as above.
13					
14					Boring terminated.

Well Construction Details

Casing material	Screen slot size	Screen Interval	Filter Pack	Cap Type
2" Schedule 40 PVC	0.020 inch	5-15 ft.	No. 2 Silica sand	Watertight cap

Security casing/manhole:	Lock type:
36" above ground galvanized casing	American

Notes:

Well Development Data

Date:	Technique:	Volume purged:
8/14/96	Waterra valve using 5/8" high density polyethylene hose.	15 gallons

	Temp (c)	SC (µS/cm)	pH	Notes: SC- specific conductance
Initial:	25	690	6.0	Water has sheen. Went dry several times during
Final:	25	800	6.0	development.

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Geologic Boring Log

Northeast Refinery Area

Boring ID	Client:	Project:	Location
40-17	Puerto Rico Sun Oil Co.	RCRA Facility Investigation	Yabucoa, Puerto Rico
Project No.	**AMAI Geologist/Engineer**	**Driller**	**Drilling Contractor**
	Néstor M. Rivera	Constancio Olivo	Jaca & Sierra
Date Started	**Date Completed**	**Drilling Method**	**Sampler type**
7/31/96	7/31/96	3.25" ID-6.0" OD Hollow Stem Auger	2"x 24" Carbon Steel Split Spoon

Depth bgl (ft)	USCS Symbol	Recovery (per 24")	Blow Counts (6" each)	PID (ppm)	Soil Description (grain size, sorting, moisture, color/hue etc.)
0	SC	15	2-4-6-7	-	**0-2 ft.** Sandy clay. Stiff to hard, slightly moist, strong brown (7.5YR5/6) to dark brown (7.5YR3/4) with grey mottles (7.5YR6/1). Sand composed of quartz, mica, pyrite and lithic fragments varying in size from fine to coarse. Roots observed.
1					
2	SM	20	3-3-3-2	-	**2-4 ft.** Silty sand to sand. Loose, slightly moist, brown (7.5YR5/4) to to yellowish brown (7.5YR3/1) with light grey mottles (7.5YR7/1). Sand composed of quartz, mica, pyrite and lithic fragments varying in size from fine to coarse. Roots observed.
3					
4	SM	15	3-3-2-2	-	**4-6 ft.** Silty/clayey sand to sand. Loose to soft, slightly moist to wet, strong brown (7.5YR5/6) to brown (7.5YR5/2). Sand composed of quartz, mica, pyrite and lithic fragments varying in size from fine to coarse.
5					
6	CL	21	2-2-1-2	-	**6-8 ft.** Sandy clay. Soft, slightly moist to wet, strong brown (7.5YR5/6) Sand composed of quartz, mica, pyrite and lithic fragments varying in size from fine to coarse.
7		▼			**8-10 ft.** Sandy clay to sand. Soft to loose, wet to saturated, strong brown (7.5YR5/6) to dark grey (5Y4/1). Sand composed of quartz, mica, pyrite and
8	CL, S	22	2-3-4-4	-	lithic fragments varying in size from fine to coarse.
9					**10-12 ft.** Sandy clay. Soft, slightly moist to wet, dark grey (5Y4/1). Sand composed of quartz, mica, pyrite and lithic fragments varying in size from fine to coarse.
10	CL	18	1-1-1-1	-	**12-14 ft.** Sandy clay to clay. Soft, slightly moist to moist, dark grey (5Y4/1) to greenish gray (Gley 1, 5/1, 5G). Sand composed of quartz, mica, pyrite and lithic fragments varying in size from fine to coarse.
11					
12	CL	24	2-2-1-2	-	
13					
14					Boring terminated.

Well Construction Details

Casing material	Screen slot size	Screen Interval	Filter Pack	Cap Type
2" Schedule 40 PVC	0.020 inch	5-15 ft.	No. 2 Silica sand	Watertight cap

Security casing/manhole:	Lock type:
36" above ground galvanized casing	American

Notes:

Filter pack from 4-15 ft. Bentonite seal from 2-4 ft. Grout from 0-2 ft

Well Development Data

Date:	Technique:	Volume purged:
8/14/96	Centrifugal pump using 5/8" high density polyethylene hose.	95 gallons

	Temp (c)	SC (µS/cm)	pH	Notes: SC- specific conductance
Initial:	25	1330	6.13	
Final:	25	1310	6.06	

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Geologic Boring Log

Northeast Refinery Area

Boring ID	Client:	Project:	Location
40-18	Puerto Rico Sun Oil Co.	RCRA Facility Investigation	Yabucoa, Puerto Rico
Project No.	**AMAI Geologist/Engineer**	**Driller**	**Drilling Contractor**
	Néstor M. Rivera	Constancio Olivo	Jaca & Sierra
Date Started	**Date Completed**	**Drilling Method**	**Sampler type**
7/30/96	7/30/96	3.25"ID-6.0"OD Hollow Stem Auger	2"x 24" Carbon Steel Split Spoon

Depth bgl (ft)	USCS Symbol	Recovery (per 24")	Blow Counts (6" each)	PID (ppm)	Soil Description (grain size, sorting, moisture, color/hue etc)
0	SM	16	3-4-4-5	-	**0-2 ft.** Silty sand to sandy silt. Loose to stiff, slightly moist, yellowish brown (10YR5/4). Sand composed of quartz, mica, pyrite, and lithic fragments varying in size from fine to very coarse. Iron oxide staining and roots observed.
1					
2	SM, SP	21	3-6-6-6	-	**2-4 ft.** Silty sand to sand. Loose to stiff, slightly moist, yellowish brown (10YR5/4). Sand composed of quartz, mica, pyrite, and lithic fragments varying in size from fine to very coarse. Iron oxide staining.
3					
4	SM	24	4-4-3-4	-	**4-6 ft.** Sand. Loose, slightly moist, brownish yellow (10YR6/6) to red (2.5YR4/6). Sand composed of quartz, mica, pyrite, and lithic fragments varying in size from fine to very coarse. Iron oxide staining.
5					
6	SM, S	21 ▼	4-3-1-2	-	**6-8 ft.** Sand to sandy clay. Loose to stiff, saturated to slightly moist, red (2.5YR4/6) to greenish grey (Gley1, 6/1,5G). Sand composed of quartz, mica, pyrite, and lithic fragments varying in size from fine to very coarse. Hydrocarbon odor and free product.
7					
8	SC	18	2-2-2-3	-	**8-10 ft.** Sandy clay. Soft, slightly moist, greenish grey (Gley1, 6/1,5G). Sand composed of quartz, mica, pyrite, and lithic fragments varying in size from fine to coarse. Hydrocarbon odor and free product.
9					
10	SC	24	1-1-1-3	-	**10-12 ft.** Sandy clay. Stiff, slightly moist, greenish grey (Gley1, 6/1,5G). Sand composed of quartz, mica, pyrite, and lithic fragments varying in size from fine to coarse. Hydrocarbon odor and free product in voids.
11					
12	SC	24	2-3-2-2	-	**12-14 ft.** Sandy clay. Stiff, slightly moist, greenish grey (Gley1, 6/1,5G). Sand composed of quartz, mica, pyrite, and lithic fragments varying in size from fine to coarse.
13					
14	SC	18	1-12 1-3	-	**14-16 ft.** Same as above. Boring terminated at 16 ft.

Well Construction Details

Casing material	Screen slot size	Screen Interval	Filter Pack	Cap Type
2" Schedule 40 PVC	0.020 inch	5-15 ft.	No. 2 Silica sand	Watertight cap

Security casing/manhole:	Lock type:
36" above ground galvanized casing	American aluminum body (key alike)

Notes:

Filter pack 4-15 ft. Bentonite seal 2-4 ft. Grout 0-2 ft.

Well Development Data

Date:	Technique:	Volume purged:
8/15/96	Centrifugal pump using 5/8" high density polyethylene hose.	25 gallons

	Temp (c)	SC (µS/cm)	pH	Notes: SC- specific conductance
Initial:	25	930	6.26	Sheen observed.
Final:	25	1220	6.35	

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Geologic Boring Log

Northeast Refinery Area

Boring ID	Client:	Project:	Location
40-19	Puerto Rico Sun Oil Co.	RCRA Facility Investigation	Yabucoa, Puerto Rico
Project No.	**AMAI Geologist/Engineer**	**Driller**	**Drilling Contractor**
	Gustavo Felipe	Constancio Olivo	Jaca & Sierra
Date Started	**Date Completed**	**Drilling Method**	**Sampler type**
8/7/96	8/7/96	3.25" ID-6.0" OD Hollow Stem Auger	2"x 24" Carbon Steel Split Spoon

Depth bgl (ft)	USCS Symbol	Recovery (per 24")	Blow Counts (6" each)	PID (ppm)	Soil Description Description made from auger cuttings, unless otherwise noted. (grain size, sorting, moisture, color/hue etc.)
0	OL	18"	2-3-2-2	0.0	**0-2 ft** - Silt and clay - densely packed organic clay, little or no sand or gravel
1					1" of rock fragments, Dry Hue 7.5 Y 4/3 Brown
2	SM	22"	8-8-8-8	0.0	**2-4 ft** - Sand and some silt, poorly graded sand and silt mix, abundant mica and pyrite
3					Dry, no product odor, Hue light yellowish brown.
4	ML	13"	4-6-3-3	0.0	**4-6 ft** - Top 5" of spoon same as above, bottom 8" of spoon - silt and clay, little
5					fine sand, no product odor, Dry Top 11" Saturated at tip of spoon, Hue brown
6	ML	12"	2-2-1-2	0.0	Hue 10.5 YR 4/3 Brown **6-8 ft** - Silty clay and fine sand, micaceous, low plasticity, densely packed
7		▼			spoon Moist at top of spoon saturated bottom of spoon, Hue grayish brown Hue 2.5 Y 4/2 Dark grayish brown.
8	ML	12"	3-1-2-2	0.0	**8-10 ft** - Top 8" fine sand and silt, same color as above, low plasticity
9					Bottom 4" coarse sand and silt. Tip of spoon is coarse sand. Saturated throughout, no product odor, Hue light gray.
10	CH	-	-	0.0	**10-14 ft** - Clay - dense gray clay, inorganic, high plasticity, no product odor
11					saturated, Hue light gray TW to be set at 14'; 10' screen; 7' riser; 3' stick up; 0.020 slot; 2" PVC
12					
13					
14					

Well Construction Details

Casing material	Screen slot size	Screen Interval	Filter Pack	Cap Type
2" Schedule 40 PVC	0.020 inch	4-14ft	No. 2 Silica sand	Watertight cap

Security casing/manhole:	Lock type:

Notes:

Well Development Data

Date:	Technique:	Volume purged:
	Centrifugal pump using 5/8" high density polyethylene hose.	

	Temp (c)	SC (µS/cm)	pH	Notes: SC- specific conductance
Initial:	-	-	-	
Final:	-	-	-	

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Geologic Boring Log

Northeast Refinery Area

Boring ID	Client:	Project:	Location
40-20	Puerto Rico Sun Oil Co.	RCRA Facility Investigation	Yabucoa, Puerto Rico
Project No.	**AMAI Geologist/Engineer**	**Driller**	**Drilling Contractor**
	Gustavo Felipe	Constancio Olivo	Jaca & Sierra
Date Started	**Date Completed**	**Drilling Method**	**Sampler type**
8/6/96	8/6/96	3.25" ID-6.00" OD Hollow Stem Auger	2"x 24" Carbon Steel Split Spoon

Depth bgl (ft)	USCS Symbol	Recovery (per 24")	Blow Counts (6" each)	PID (ppm)	Soil Descriptions Description made from auger cuttings, unless otherwise noted. (grain size, sorting, moisture, color/hue etc.)
0	OL			0.0	**0-2 ft** - Top soil organic rich silt and clay, little or no sand or gravel. No product odor. No visible contamination. Dry Hue brownish red.
1					
2	OL			0.0	**2-6 ft** - Same as above - highly oxidized red soil. Dry
3					
4					
5					
6	SM	14"	3-3-3-3	0.0	**6-8 ft** - Medium sand and silt- micaceous, highly oxidized. No visible contamination. No product odor. Dry top of spoon, saturated at tip of spoon. Hue
7		▼			
8	SM	18"	3-3-3-4	0.0	**8-10 ft** - Same as above. Saturated throughout, no visible contamination, no product odor.
9					
10					**10-16 ft** - Sand and silt lenses gray reddish clay at ~12'. Install temporary well point at 16'.
11					
12					
13					
14					

Well Construction Details

Casing material	Screen slot size	Screen Interval	Filter Pack	Cap Type
2" Schedule 40 PVC	0.020 inch	08' - 16'	No. 2 Silica sand	Watertight cap

Security casing/manhole:	Lock type:
4" Galvanized steel security cap	American

Notes: Filter pack 06'-16'; Grout 0.0'-0.6'

Well Development Data

Date: 8/19/96	Technique:	Volume purged:
	Centrifugal pump using 5/8" high density polyethylene hose.	~ 55 gal

	Temp (°C)	SC (µS/cm)	pH	Notes: SC- specific conductance
Initial:	25	810	6.44	
Final:	25	770	5.95	

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Geologic Boring Log

West API Separator SWMU 02

Boring ID	Client:	Project:	Location
02-01	Puerto Rico Sun Oil Company	RCRA Facility Investigation	Yabucoa, Puerto Rico
Project No.	**AMAI Geologist/Engineer**	**Driller**	**Drilling Contractor**
	Néstor M. Rivera	Mario Sierra	Jaca & Sierra
Date Started	**Date Completed**	**Drilling Method**	**Sampler type**
7/10/96	7/10/96	Tripod	2"x 24" Carbon Steel Split Spoon

Depth bgl (ft.)	USCS Symbol	Recovery (per 24")	Blow Counts (per 6")	PID (ppm)	Soil Description Description made from auger cuttings, unless otherwise noted. (grain size, sorting, moisture, color/hue etc.)
0	SP, CL	10	2-1-1\12	1	**0-2 ft.** Gravelly sand to sand to sandy clay. Loose to soft, slightly moist, black (10YR2/1) to yellowish brown (10YR5/4) to dark reddish gray (5YR4/2) Sand composed of quartz, mica, pyrite, shell and lithic fragments varying in size from fine to coarse. Roots observed. Immunoassay sample collected.
1	**Sample collected**	▼			
2	CL	18	2-2-2-3	2	**2-4 ft.** Sandy silt. Soft, slightly moist to moist, yellowish brown (10YR5/4) Sand composed of quartz, mica, pyrite, shell and lithic fragments varying in size from fine to coarse. Immunoassay sample collected.
3	**Sample collected**				
4	SP	24	3-3-2-2	3	**4-6 ft.** Silty sand. Loose, moist to saturated, yellowish brown (10YR5/4) Sand composed of quartz, mica, pyrite, shell and lithic fragments varying in size from fine to coarse.
5					
6					Boring terminated.

Soil Descriptions*

Type	Size (mm)			Gravel	Sym		Silt & Clay	Sym	
	Coarse	*Medium*	*Fine*	no fines	GW	well graded gravel	*Inorganic*		
Gravel	19-75		4.8-19	little fines	GP	poorly graded gravel	low plast.	ML	silts and very fine sand
Sand	2.0-4 8	.43-2.0	.08-.043	some fines	GM	sand,silt,gravel mix	low plast.	CL	gravelly,sandy,silty clay
Silt & clay			<.08	some fines	GC	sand,clay,gravel,mix	high plast.	MH	micaceous/diatomaceous
Soil density	very loose	loose	med. dense	Sand			high plast.	CH	high plasticity clay
	dense	very dense		no fines	SW	well graded gravelly	*Organic*		
Angularity	very ang	angular	sub angular	little fines	SP	poorly graded gravelly	low plast.	OL	silty clay low plasticity
	sub round	rounded	well round	some fines	SM	silty-sand sandy-silt	high plast.	OH	clay med. to high plasticity
Note - density also in blows/foot above				some fines	SC	sand clay mixture	Peat	PT	humus,swamp soils, organic

* Source Unified Soil Classification System.

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Geologic Boring Log

West API Separator SWMU 02

Boring ID	Client:	Project:	Location
02-02	Puerto Rico Sun Oil Company	RCRA Facility Investigation	Yabucoa, Puerto Rico
Project No.	**AMAI Geologist/Engineer**	**Driller**	**Drilling Contractor**
	Néstor M. Rivera	Mario Sierra	Jaca & Sierra
Date Started	**Date Completed**	**Drilling Method**	**Sampler type**
7/12/96	7/12/96	Tripod	2"x 24" Carbon Steel Split Spoon

Depth bgl (ft.)	USCS Symbol	Recovery (per 24")	Blow Counts (per 6")	PID (ppm)	Soil Description (Description made from auger cuttings, unless otherwise noted. (grain size, sorting, moisture, color/hue etc.)
0	ML	18	5-8-2-3	1	**0-2 ft.** Sandy silt. Soft, slightly moist, yellowish brown (10YR5/6). Sand composed of quartz, mica, pyrite, and lithic fragments varying in size from fine to coarse. Full analyses and immunoassay samples collected.
1					
	Sample collected				
2	SM	20 ▼	5-5-4-3	1	**2-4 ft.** Silty sand. Loose, moist, yellowish brown (10YR5/4). Sand composed of quartz, mica, pyrite, shell and lithic fragments varying in size from fine to coarse. Full analyses and immunoassay samples collected.
3	**Sample collected**				
4	SP, SM	18	2-4-10-1	3	**4-6 ft.** Silty to gravelly sand to sand. Loose to stiff, saturated, yellowish brown(10YR5/4) to greenish gray (Gley1,4/1,10GY). Sand composed of quartz, mica, pyrite, shell and lithic fragments varying in size from fine to coarse. Gravel composed of quartz and igneous rock fragments. Full analyses and immunoassay samples collected. Boring terminated.
5	**Sample collected**				
6					

Soil Descriptions*

Type	Size (mm)			Gravel	Sym		Silt & Clay	Sym	
	Coarse	*Medium*	*Fine*	no fines	GW	well graded gravel	*Inorganic*		
Gravel	19-75		4.8-19	little fines	GP	poorly graded gravel	low plast.	ML	silts and very fine sand
Sand	2.0-4.8	.43-2.0	.08-.043	some fines	GM	sand,silt,gravel mix	low plast.	CL	gravelly,sandy,silty clay
Silt & clay			< 08	some fines	GC	sand,clay,gravel,mix	high plast.	MH	micaceous/diatomaceous
Soil density	very loose	loose	med. dense	**Sand**			high plast.	CH	high plasticity clay
	dense	very dense		no fines	SW	well graded gravelly	*Organic*		
Angularity	very ang.	angular	sub angular	little fines	SP	poorly graded gravelly	low plast.	OL	silty clay low plasticity
	sub round	rounded	well round	some fines	SM	silty-sand sandy-silt	high plast.	OH	clay med. to high plasticity
Note - density also in blows/foot above				some fines	SC	sand clay mixture	Peat	PT	humus,swamp soils, organic

* Source Unified Soil Classification System.

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Geologic Boring Log

West API Separator SWMU 02

Boring ID	Client:	Project:	Location
02-03	Puerto Rico Sun Oil Company	RCRA Facility Investigation	Yabucoa, Puerto Rico
Project No.	**AMAI Geologist/Engineer**	**Driller**	**Drilling Contractor**
	Néstor M. Rivera	Mario Sierra	Jaca & Sierra
Date Started	**Date Completed**	**Drilling Method**	**Sampler type**
7/12/96	7/12/96	Tripod	2"x 24" Carbon Steel Split Spoon

Depth bgl (ft.)	USCS Symbol	Recovery (per 24")	Blow Counts (per 6")	PID (ppm)	Soil Description (Description made from auger cuttings, unless otherwise noted (grain size, sorting, moisture, color/hue etc.)
0	SM	22	2-2-4-5	5	**0-2 ft.** Silty sand. Loose, slightly moist, yellowish brown (10YR5/6). Sand composed of quartz, mica, pyrite, shell and lithic fragments varying in size from fine to coarse. Roots observed.
1					
	Sample collected				Full analyses and Immunoassay samples collected.
2	SM	12	2-2-2	6	**2-3.5 ft.** Silty sand. Loose, slightly moist, brown (10YR5/3). Sand composed of quartz, mica, pyrite, shell and lithic fragments varying in size from fine to coarse. Immunoassay samples collected.
	Sample collected				
3		▼			
		18		4	**3.5-5.5 ft.** Silty sand to sand. Loose, saturated, yellowish brown (10YR5/3) to dark greenish gray (Gley1,4/1, 10GY) to olive gray (5Y5/2). Sand composed of quartz, mica, pyrite, shell and lithic fragments varying in size from fine to coarse. Immunoassay samples collected.
4			5-5-4		
	Sample collected				
5					
6					Boring terminated.

Soil Descriptions*

Type	Size (mm)			Gravel	Sym		Silt & Clay	Sym	
	Coarse	*Medium*	*Fine*	no fines	GW	well graded gravel	*Inorganic*		
Gravel	19-75		4.8-19	little fines	GP	poorly graded gravel	low plast.	ML	silts and very fine sand
Sand	2.0-4.8	.43-2.0	.08-.043	some fines	GM	sand,silt,gravel mix	low plast.	CL	gravelly,sandy,silty clay
Silt & clay			<.08	some fines	GC	sand,clay,gravel,mix	high plast.	MH	micaceous/diatomaceous
Soil density	very loose	loose	med. dense	**Sand**			high plast.	CH	high plasticity clay
	dense	very dense		no fines	SW	well graded gravelly	*Organic*		
Angularity	very ang.	angular	sub angular	little fines	SP	poorly graded gravelly	low plast.	OL	silty clay low plasticity
	sub round	rounded	well round	some fines	SM	silty-sand sandy-silt	high plast.	OH	clay med. to high plasticity
Note - density also in blows/foot above				some fines	SC	sand clay mixture	**Peat**	PT	humus,swamp soils, organic

* Source Unified Soil Classification System.

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Geologic Boring Log

West API Separator SWMU 02

Boring ID	Client:	Project:	Location
02-04	Puerto Rico Sun Oil Company	RCRA Facility Investigation	Yabucoa, Puerto Rico
Project No.	**AMAI Geologist/Engineer**	**Driller**	**Drilling Contractor**
	Néstor M. Rivera	Mario Sierra	Jaca & Sierra
Date Started	**Date Completed**	**Drilling Method**	**Sampler type**
7/12/96	7/12/96	Tripod	2"x 24" Carbon Steel Split Spoon

Depth bgl (ft.)	USCS Symbol	Recovery (per 24")	Blow Counts (per 6")	PID (ppm)	Soil Description Description made from auger cuttings, unless otherwise noted. (grain size, sorting, moisture, color/hue etc.)
0	SM	14	14-6-5-4	1	**0-2 ft.** Silty sand. Loose, slightly moist, yellowish brown (10YR5/6). Sand composed of quartz, mica, pyrite, shell and lithic fragments varying in size from fine to coarse. Immunoassay samples collected.
1	**Sample collected**				
2	SM	12	2-2-2	1	**2-3.5 ft.** Sand. Loose, moist to wet, yellowish brown (10YR5/4). Sand composed of quartz, mica, pyrite, shell and lithic fragments varying in size from fine to coarse. Immunoassay (and duplicate) samples collected.
	Sample collected				
3		▼			
4					Boring terminated.

Soil Descriptions*

Type	Size (mm)			Gravel	Sym		Silt & Clay	Sym	
	Coarse	*Medium*	*Fine*	no fines	GW	well graded gravel	*Inorganic*		
Gravel	19-75		4.8-19	little fines	GP	poorly graded gravel	low plast.	ML	silts and very fine sand
Sand	2.0-4.8	.43-2.0	.08-.043	some fines	GM	sand,silt,gravel mix	low plast.	CL	gravelly,sandy,silty clay
Silt & clay			<.08	some fines	GC	sand,clay,gravel,mix	high plast.	MH	micaceous/diatomaceous
Soil density	very loose	loose	med. dense	**Sand**			high plast.	CH	high plasticity clay
	dense	very dense		no fines	SW	well graded gravelly	*Organic*		
Angularity	very ang.	angular	sub angular	little fines	SP	poorly graded gravelly	low plast.	OL	silty clay low plasticity
	sub round	rounded	well round	some fines	SM	silty-sand sandy-silt	high plast.	OH	clay med. to high plasticity
Note - density also in blows/foot above				some fines	SC	sand clay mixture	**Peat**	PT	humus,swamp soils, organic

* Source Unified Soil Classification System.

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Geologic Boring Log

West API Separator SWMU 02

Boring ID	Client:	Project:	Location
02-05	Puerto Rico Sun Oil Company	RCRA Facility Investigation	Yabucoa, Puerto Rico
Project No.	**AMAI Geologist/Engineer**	**Driller**	**Drilling Contractor**
	Néstor M. Rivera	Mario Olivo	Jaca & Sierra
Date Started	**Date Completed**	**Drilling Method**	**Sampler type**
7/12/96	7/12/96	Tripod	2"x 24" Carbon Steel Split Spoon

Depth bgl (ft.)	USCS Symbol	Recovery (per 24")	Blow Counts (per 6")	PID (ppm)	Soil Description Description made from auger cuttings, unless otherwise noted. (grain size, sorting, moisture, color/hue etc.)
0	SP, SM	18	5-3-3-4	0	0-2 ft. Gravelly to silty sand to sand. Loose, slightly moist, yellowish brown (10YR5/6) to dark yellowish brown (10YR3/4). Sand composed of quartz, mica, pyrite, shell and lithic fragments varying in size from fine to coarse. Full analyses and immunoassay samples collected.
1	Sample collected				
2	SM	18	3-6-9-12	1	2-4 ft. Sand. Loose, wet to saturated, yellowish brown (10YR5/4) to greenish gray (Gley 1, 5/1, 5G). Sand composed of quartz, mica, pyrite, shell and lithic fragments varying in size from fine to coarse.
3		▼			Full analyses and immunoassay samples collected.
	Sample collected				
4					Boring terminated.

Soil Descriptions*

Type	Size (mm)			Gravel	Sym		Silt & Clay	Sym	
	Coarse	*Medium*	*Fine*	no fines	GW	well graded gravel	*Inorganic*		
Gravel	19-75		4.8-19	little fines	GP	poorly graded gravel	low plast.	ML	silts and very fine sand
Sand	2.0-4.8	.43-2.0	.08-.043	some fines	GM	sand,silt,gravel mix	low plast.	CL	gravelly,sandy,silty clay
Silt & clay			<.08	some fines	GC	sand,clay,gravel,mix	high plast.	MH	micaceous/diatomaceous
Soil density	very loose	loose	med. dense	Sand			high plast.	CH	high plasticity clay
	dense	very dense		no fines	SW	well graded gravelly	*Organic*		
Angularity	very ang.	angular	sub angular	little fines	SP	poorly graded gravelly	low plast.	OL	silty clay low plasticity
	sub round	rounded	well round	some fines	SM	silty-sand sandy-silt	high plast.	OH	clay med. to high plasticity
Note - density also in blows/foot above				some fines	SC	sand clay mixture	Peat	PT	humus,swamp soils, organic

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Geologic Boring Log

West API Separator SWMU 02

Boring ID	Client:	Project:	Location
02-06	Puerto Rico Sun Oil Company	RCRA Facility Investigation	Yabucoa, Puerto Rico
Project No.	**AMAI Geologist/Engineer**	**Driller**	**Drilling Contractor**
	Néstor M. Rivera	Mario Sierra	Jaca & Sierra
Date Started	**Date Completed**	**Drilling Method**	**Sampler type**
7/12/96	7/12/96	Tripod	2"x 24" Carbon Steel Split Spoon

Depth bgl (ft.)	USCS Symbol	Recovery (per 24")	Blow Counts (per 6")	PID (ppm)	Soil Description (Description made from auger cuttings, unless otherwise noted. (grain size, sorting, moisture, color/hue etc.)
0	SM	14	4-3-2-2	0	**0-2 ft.** Silty sand. Loose, slightly moist, yellowish brown (10YR5/6) to dark yellowish brown (10YR4/4). Sand composed of quartz, mica, pyrite, shell and lithic fragments varying in size from fine to coarse. Immunoassay samples collected.
	Sample collected				
1					
2	SM	20	3-5-5-12	0	**2-4 ft.** Sand. Loose, wet, yellowish brown (10YR5/4) to blueish gray (Gley2, 6/1, 5G). Sand composed of quartz, mica, pyrite, shell and lithic fragments varying in size from fine to coarse. Immunoassay samples collected. Boring terminated.
3		▼			
	Sample collected				
4					

Soil Descriptions*

Type	Size (mm)			Gravel	Sym		Silt & Clay	Sym	
	Coarse	*Medium*	*Fine*	no fines	GW	well graded gravel	*Inorganic*		
Gravel	19-75		4.8-19	little fines	GP	poorly graded gravel	low plast.	ML	silts and very fine sand
Sand	2.0-4.8	.43-2.0	.08-.043	some fines	GM	sand,silt,gravel mix	low plast.	CL	gravelly,sandy,silty clay
Silt & clay			<.08	some fines	GC	sand,clay,gravel,mix	high plast.	MH	micaceous/diatomaceous
Soil density	very loose	loose	med. dense	**Sand**			high plast.	CH	high plasticity clay
	dense	very dense		no fines	SW	well graded gravelly	*Organic*		
Angularity	very ang.	angular	sub angular	little fines	SP	poorly graded gravelly	low plast.	OL	silty clay low plasticity
	sub round	rounded	well round	some fines	SM	silty-sand sandy-silt	high plast.	OH	clay med. to high plasticity
Note - density also in blows/foot above				some fines	SC	sand clay mixture	**Peat**	PT	humus,swamp soils, organic

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Geologic Boring Log

West API Separator SWMU 02

Boring ID	Client:	Project:	Location
02-07	Puerto Rico Sun Oil Company	RCRA Facility Investigation	Yabucoa, Puerto Rico
Project No.	**AMAI Geologist/Engineer**	**Driller**	**Drilling Contractor**
	Gustavo Felipe	Mario Sierra	Jaca & Sierra
Date Started	**Date Completed**	**Drilling Method**	**Sampler type**
7/12/96	7/12/96	Tripod	2"x 24"/18" Carbon St Split Spoon

Depth bgl (ft.)	USCS Symbol	Recovery (per 24")	Blow Counts (per 6")	PID (ppm)	Soil Description Description made from auger cuttings, unless otherwise noted. (grain size, sorting, moisture, color/hue etc.)
0	GM	18	5-3-3-5	0	0-2 ft. Silty and sandy gravel. Loose, moist, very dark gray (10YR3/1) to brown (10YR5/3). Sand composed of quartz, mica, pyrite, shell and lithic fragments varying in size from fine to coarse. Immunoassay samples collected.
	Sample collected				
1					
2	SC	18	4-3-3-5	0	2-4 ft. Sand. Loose, saturated, brown (10YR5/3). Sand composed of quartz, mica, pyrite, shell and lithic fragments varying in size from fine to coarse. Immunoassay samples collected.
3		▼			
	Sample collected				
4					Boring terminated.

Soil Descriptions*

Type	Size (mm)			Gravel	Sym		Silt & Clay	Sym	
	Coarse	*Medium*	*Fine*	no fines	GW	well graded gravel	*Inorganic*		
Gravel	19-75		4.8-19	little fines	GP	poorly graded gravel	low plast.	ML	silts and very fine sand
Sand	2.0-4.8	.43-2.0	.08-.043	some fines	GM	sand,silt,gravel mix	low plast.	CL	gravelly,sandy,silty clay
Silt & clay			<.08	some fines	GC	sand,clay,gravel,mix	high plast.	MH	micaceous/diatomaceous
Soil density	very loose	loose	med. dense	**Sand**			high plast.	CH	high plasticity clay
	dense	very dense		no fines	SW	well graded gravelly	*Organic*		
Angularity	very ang.	angular	sub angular	little fines	SP	poorly graded gravelly	low plast.	OL	silty clay low plasticity
	sub round	rounded	well round	some fines	SM	silty-sand sandy-silt	high plast.	OH	clay med. to high plasticity
Note - density also in blows/foot above				some fines	SC	sand clay mixture	Peat	PT	humus,swamp soils, organic

* Source Unified Soil Classification System

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Geologic Boring Log

West API Separator SWMU 02

Boring ID	Client:	Project:	Location
02-08	Puerto Rico Sun Oil Company	RCRA Facility Investigation	Yabucoa, Puerto Rico
Project No.	**AMAI Geologist/Engineer**	**Driller**	**Drilling Contractor**
	Néstor M. Rivera	Mario Sierra	Jaca & Sierra
Date Started	**Date Completed**	**Drilling Method**	**Sampler type**
7/12/96	7/12/96	Tripod	2"x 24" Carbon Steel Split Spoon

Depth bgl (ft.)	USCS Symbol	Recovery (per 24")	Blow Counts (per 6")	PID (ppm)	Soil Description (Description made from auger cuttings, unless otherwise noted. (grain size, sorting, moisture, color/hue etc.))
0	SP, SM	18	7-5-3-2	4	**0-2 ft.** Gravelly silty sand . Loose, slightly moist, black (Gley1, 2.5/N) to dark yellowish brown (10YR4/4) to yellowish brown (10YR5/4). Sand composed of quartz, mica, pyrite, shell and lithic fragments varying in size fine to coarse. Top soil showed hydrocarbon odor and staining. Immunoassay samples collected.
1	**Sample collected**				
2	SM	18	2-1-1-2	2	**2-4 ft.** Sand. Loose, wet to saturated, yellowish brown (10YR5/4). Sand composed of quartz, mica, pyrite, shell and lithic fragments varying in size from fine to coarse. Full analyses and immunoassay samples collected. Boring terminated.
3	**Sample collected**	▼			
4					

Soil Descriptions*

Type	Size (mm)			Gravel	Sym		Silt & Clay	Sym	
	Coarse	*Medium*	*Fine*	no fines	GW	well graded gravel	*Inorganic*		
Gravel	19-75		4.8-19	little fines	GP	poorly graded gravel	low plast.	ML	silts and very fine sand
Sand	2.0-4.8	.43-2.0	.08- 043	some fines	GM	sand,silt,gravel mix	low plast.	CL	gravelly,sandy,silty clay
Silt & clay			<.08	some fines	GC	sand,clay,gravel,mix	high plast.	MH	micaceous/diatomaceous
Soil density	very loose	loose	med. dense	**Sand**			high plast.	CH	high plasticity clay
	dense	very dense		no fines	SW	well graded gravelly	*Organic*		
Angularity	very ang.	angular	sub angular	little fines	SP	poorly graded gravelly	low plast.	OL	silty clay low plasticity
	sub round	rounded	well round	some fines	SM	silty-sand sandy-silt	high plast.	OH	clay med. to high plasticity
Note - density also in blows/foot above				some fines	SC	sand clay mixture	**Peat**	PT	humus,swamp soils, organic

* Source Unified Soil Classification System.

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Geologic Boring Log

East API Separator SWMU 03

Boring ID	Client:	Project:	Location
03-01	Puerto Rico Sun Oil Company	RCRA Facility Investigation	Yabucoa, Puerto Rico
Project No.	**AMAI Geologist/Engineer**	**Driller**	**Drilling Contractor**
	Néstor M. Rivera	Mario Sierra	Jaca & Sierra
Date Started	**Date Completed**	**Drilling Method**	**Sampler type**
7/2/96	7/2/96	Tripod	2"x 24" Carbon Steel Split Spoon

Depth bgl (ft.)	USCS Symbol	Recovery (per 24")	Blow Counts (per 6")	PID (ppm)	Soil Description (Descriptions made from auger cuttings, unless otherwise noted (grain size, sorting, moisture, color/hue etc.)
0	SP, SM	12	4-5-6-6	5	**0-2 ft.** Gravelly sand to sand. Loose, slightly moist, dark olive brown (2.5Y3/3) to light yellowish brown (2.5Y6/3). Sand composed of quartz, mica, pyrite, shell and lithic fragments varying in size from fine to coarse. Coarse gravel
1	**Sample collected**				Immunoassay sample collected.
2	SM	12	3-3-4-2	57	**2-4 ft.** Sand. Loose, moist, black (2.5Y2.1/1). Sand composed of quartz, mica, pyrite, shell and lithic fragments varying in size from fine to coarse.
3	**Sample collected**				Strong product odor and stains on sampler. Immunoassay sample collected. Full analysis sample collected
4	SM	20	3-3-5-7	8	**4-6 ft.** Sand. Same as above, bottom of spoon : light yellow
	Sample collected				to light gray (2.5Y7/1). Sand composed of quartz, mica, pyrite, shell and lithic
5		▼			fragments varying in size from fine to coarse. Locally thin clay layers were observed. Hydrocarbon odor. Immunoassay samples collected.
6					Hue:black (2.5Y2.1/1) to light yellowish brown (2.5Y6/3)
					Boring terminated

Soil Descriptions*

Type	Size (mm)			Gravel	Sym		Silt & Clay	Sym	
	Coarse	*Medium*	*Fine*	no fines	GW	well graded gravel	*Inorganic*		
Gravel	19-75		4.8-19	little fines	GP	poorly graded gravel	low plast.	ML	silts and very fine sand
Sand	2.0-4.8	.43-2.0	.08-.043	some fines	GM	sand,silt,gravel mix	low plast.	CL	gravelly,sandy,silty clay
Silt & clay			<.08	some fines	GC	sand,clay,gravel,mix	high plast.	MH	micaceous/diatomaceous
Soil density	very loose	loose	med. dense	Sand			high plast.	CH	high plasticity clay
	dense	very dense		no fines	SW	well graded gravelly	*Organic*		
Angularity	very ang.	angular	sub angular	little fines	SP	poorly graded gravelly	low plast.	OL	silty clay low plasticity
	sub round	rounded	well round	some fines	SM	silty-sand sandy-silt	high plast.	OH	clay med. to high plasticity
Note - density also in blows/foot above				some fines	SC	sand clay mixture	Peat	PT	humus,swamp soils, organic

* Source Unified Soil Classification System.

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Geologic Boring Log

East API Separator SWMU 03

Boring ID	Client:	Project:	Location
03-02	Puerto Rico Sun Oil Company	RCRA Facility Investigation	Yabucoa, Puerto Rico
Project No.	**AMAI Geologist/Engineer**	**Driller**	**Drilling Contractor**
	Néstor M Rivera	Mario Sierra	Jaca & Sierra
Date Started	**Date Completed**	**Drilling Method**	**Sampler type**
7/2/96	7/2/96	Tripod	2"x 24" Carbon Steel Split Spoon

Depth bgl (ft.)	USCS Symbol	Recovery (per 24")	Blow Counts (per 6")	PID (ppm)	Soil Description Description made from auger cuttings, unless otherwise noted. (grain size, sorting, moisture, color/hue etc.)
0	SP, SM	16	3-3-1-4	0	**0-2 ft.** Gravelly sand to sandy clay to sand. Loose to soft, slightly moist, dark olive brown (2.5Y3/3) to light yellowish brown (2.5Y6/3). Sand composed of quartz, mica, pyrite, shell and lithic fragments varying in size from fine to coarse. no product odor, no product staining
1					
2	SM	18	3-2-2-1	0	**2-4 ft.** Sand. Loose, moist, brown (10YR5/3). Sand composed of quartz, mica, pyrite, shell and lithic fragments varying in size from fine to coarse.
3	**Sample collected**				No product odor, no product staining. Immunoassay samples collected.
4	SM	16	3-4-7-6	0	**4-6 ft.** Sand. Loose, moist, black (2.5Y2.1/1) to light yellowish brown (2.5Y6/3). Sand composed of quartz, mica, pyrite, shell and lithic fragments varying in size from fine to coarse. Weathered rock fragments encountered in a wet sandy silt matrix. Immunoassay samples collected.
5	**Sample collected**	▼			
6					Boring terminated

Soil Descriptions*

Type	Size (mm)			Gravel	Sym		Silt & Clay	Sym	
	Coarse	*Medium*	*Fine*	no fines	GW	well graded gravel	*Inorganic*		
Gravel	19-75		4.8-19	little fines	GP	poorly graded gravel	low plast.	ML	silts and very fine sand
Sand	2.0-4.8	.43-2.0	.08-.043	some fines	GM	sand,silt,gravel mix	low plast.	CL	gravelly,sandy,silty clay
Silt & clay			<.08	some fines	GC	sand,clay,gravel,mix	high plast.	MH	micaceous/diatomaceous
Soil density	very loose	loose	med. dense	Sand			high plast.	CH	high plasticity clay
	dense	very dense		no fines	SW	well graded gravelly	*Organic*		
Angularity	very ang.	angular	sub angular	little fines	SP	poorly graded gravelly	low plast.	OL	silty clay low plasticity
	sub round	rounded	well round	some fines	SM	silty-sand sandy-silt	high plast.	OH	clay med. to high plasticity
Note - density also in blows/foot above				some fines	SC	sand clay mixture	Peat	PT	humus,swamp soils, organic

* Source Unified Soil Classification System.

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Geologic Boring Log

East API Separator SWMU 03

Boring ID	Client:	Project:	Location
03-03	Puerto Rico Sun Oil Company	RCRA Facility Investigation	Yabucoa, Puerto Rico
Project No.	**AMAI Geologist/Engineer**	**Driller**	**Drilling Contractor**
	Néstor M Rivera	Mario Sierra	Jaca & Sierra
Date Started	**Date Completed**	**Drilling Method**	**Sampler type**
7/3/96	7/3/96	Tripod	2"x 24" Carbon Steel Split Spoon

Depth bgl (ft.)	USCS Symbol	Recovery (per 24")	Blow Counts (per 6")	PID (ppm)	Soil Description Description made from auger cuttings, unless otherwise noted. (grain size, sorting, moisture, color/hue etc.)
0	SP, SM	12	10-7-1-2	6	**0-2 ft.** Gravelly sand to sandy clay to sand. Loose to soft, slightly moist, very dark gray (10YR3/1) to dark yellowish brown (10YR4/4). Sand composed of quartz, mica, pyrite, shell and lithic fragments varying in size from fine to coarse. Full analysis and Immunoassay samples collected.
1					
	Sample collected				
2	SM	16	1-1-12-2	2	**2-4 ft.** Sand. Loose, slightly moist, dark yellowish brown (10YR4/4). Sand composed of quartz, mica, pyrite, shell and lithic fragments
3	**Sample collected**				varying in size from fine to coarse. no visual contamination, no product odor Full Analysis and Immunoassay samples collected.
4	SM	24	3-2-1-4	--	**4-6 ft.** Top of spoon (8") same as above, Middle of spoon (6") Clay dark yellowish brown to black, (10YR4/4). Bottom of spoon - Sand composed of quartz, mica, pyrite, and lithic fragments varying in size from fine to coarse. no product odor no product staining.
5					
6					Continue with drilling point to 7-ft, to collect following sample
7	CL	24	7-3-3-4	0	**7-9 ft.** Silty sand to sandy clay. Loose to soft, slightly moist, dark yellowish brown (10YR4/4). Sand composed of quartz, mica, pyrite, shell and lithic fragments varying in size from fine to coarse. Grey mottles locally observed. no product odor no product stains, Full Analysis and Immunoassay samples collected.
8	**Sample collected**				
		▼			
9					Boring terminated

Soil Descriptions*

Type	Size (mm)			Gravel	Sym		Silt & Clay	Sym	
	Coarse	*Medium*	*Fine*	no fines	GW	well graded gravel	*Inorganic*		
Gravel	19-75		4.8-19	little fines	GP	poorly graded gravel	low plast.	ML	silts and very fine sand
Sand	2.0-4.8	.43-2.0	.08-.043	some fines	GM	sand,silt,gravel mix	low plast.	CL	gravelly,sandy,silty clay
Silt & clay			<.08	some fines	GC	sand,clay,gravel,mix	high plast.	MH	micaceous/diatomaceous
Soil density	very loose	loose	med. dense	Sand			high plast.	CH	high plasticity clay
	dense	very dense		no fines	SW	well graded gravelly	*Organic*		
Angularity	very ang.	angular	sub angular	little fines	SP	poorly graded gravelly	low plast.	OL	silty clay low plasticity
	sub round	rounded	well round	some fines	SM	silty-sand sandy-silt	high plast.	OH	clay med. to high plasticity
Note - density also in blows/foot above				some fines	SC	sand clay mixture	Peat	PT	humus,swamp soils, organic

* Source Unified Soil Classification System

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Geologic Boring Log

East API Separator SWMU 03

Boring ID	Client:	Project:	Location
03-04	Puerto Rico Sun Oil Company	RCRA Facility Investigation	Yabucoa, Puerto Rico
Project No.	**AMAI Geologist/Engineer**	**Driller**	**Drilling Contractor**
	Gustavo Felipe	Mario Sierra	Jaca & Sierra
Date Started	**Date Completed**	**Drilling Method**	**Sampler type**
7/2/96	7/2/96	Tripod	2"x 24" Carbon Steel Split Spoon

Depth bgl (ft.)	USCS Symbol	Recovery (per 24")	Blow Counts (per 6")	PID (ppm)	Soil Description Description made from auger cuttings, unless otherwise noted. (grain size, sorting, moisture, color/hue etc.)
0	SM	16	3-4-4-6	25	**0-2 ft.** Sand and silt, abundant gravel and rock fragments, Dry
	Sample collected				poorly graded, loosely packed spoon, no product odor
1					or visual contamination Hue 2.5 Y 5/3 light olive br.
					Immunoasay sample collected.
2	SM	12	5-4-3-2	28	**2-4 ft.** Sand med well graded loose sand, very moist, little or no gravel or
					larger sizes, no product odor, no visual contamination, Hue light yellowish
3	**Sample collected**				brown 10 YR 5/4 Immunoassay sample collected
4	SM	12	2-2-3-4	25	**4-6 ft.** Sand, fine sand , and silt - little or no gravel, trace mica and pyrite
					no product odor, or visual contamination Hue light yellowish brown
5					10YR 5/3 Bottom (4") saturated
	Sample collected				Immunoassay sample collected
6		▼			Boring terminated

Soil Descriptions*

Type	Size (mm)			Gravel	Sym		Silt & Clay	Sym	
	Coarse	*Medium*	*Fine*	no fines	GW	well graded gravel	*Inorganic*		
Gravel	19-75		4.8-19	little fines	GP	poorly graded gravel	low plast.	ML	silts and very fine sand
Sand	2.0-4.8	.43-2.0	.08-.043	some fines	GM	sand,silt,gravel mix	low plast.	CL	gravelly,sandy,silty clay
Silt & clay			<.08	some fines	GC	sand,clay,gravel,mix	high plast.	MH	micaceous/diatomaceous
Soil density	very loose	loose	med. dense	Sand			high plast.	CH	high plasticity clay
	dense	very dense		no fines	SW	well graded gravelly	*Organic*		
Angularity	very ang.	angular	sub angular	little fines	SP	poorly graded gravelly	low plast.	OL	silty clay low plasticity
	sub round	rounded	well round	some fines	SM	silty-sand sandy-silt	high plast.	OH	clay med. to high plasticity
Note - density also in blows/foot above				some fines	SC	sand clay mixture	Peat	PT	humus,swamp soils, organic

* Source Unified Soil Classification System.

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New York, New York 10012

Geologic Boring Log

East API Separator SWMU 03

Boring ID	Client:	Project:	Location
03-05	Puerto Rico Sun Oil Company	RCRA Facility Investigation	Yabucoa, Puerto Rico
Project No.	**AMAI Geologist/Engineer**	**Driller**	**Drilling Contractor**
	Néstor M Rivera	Mario Sierra	Jaca & Sierra
Date Started	**Date Completed**	**Drilling Method**	**Sampler type**
7/3/96	7/3/96	Tripod	2"x 24" Carbon Steel Split Spoon

Depth bgl (ft.)	USCS Symbol	Recovery (per 24")	Blow Counts (per 6")	PID (ppm)	Soil Description Description made from auger cuttings, unless otherwise noted. (grain size, sorting, moisture, color/hue etc.)
0	SM	12	4-1-2-1	1	**0-2 ft.** Sand. Loose, slightly moist, black (Gley1,2.5/N) to dark yellowish brown (10YR4/4). Sand composed of quartz, mica, pyrite, shell and lithic fragments varying in size from fine to coarse. Roots observed. no product odor, no visual contamination. Immunoassay sample collected
	Sample collected				
1					
2	SM	18	2-4-6-8	1	**2-4 ft.** Sand. Loose, slightly moist to moist,brown (10YR4/3). Sand composed of quartz, mica, pyrite, shell and lithic fragments varying in size from fine to varying in size from fine to coarse. Immunoassay sample collected
3	Sample collected				
4					**4-6 ft.** Boring drilled with drive point, no soil sampling. Sample from 7-9 ft. interval obtained no recovery and an offset boring was drilled to 7 ft. The 7-9 ft. sample was recovered.
7	SM	12	2-1-1-1	1	**7-9 ft.** Sand to sandy clay. quartz, pyrite, mica, are abundant, Hue dark gr. grey (gley 2 5/1 10GB)to dark greenish gray (Gley1, 4/1, 10Y). no product odor no visual contamination Immunoassay sample collected
8	Sample collected				
9					Boring terminated.

Soil Descriptions*

Type	Size (mm)			Gravel	Sym		Silt & Clay	Sym	
	Coarse	*Medium*	*Fine*	no fines	GW	well graded gravel	*Inorganic*		
Gravel	19-75		4.8-19	little fines	GP	poorly graded gravel	low plast.	ML	silts and very fine sand
Sand	2.0-4.8	.43-2.0	.08-.043	some fines	GM	sand,silt,gravel mix	low plast.	CL	gravelly,sandy,silty clay
Silt & clay			<.08	some fines	GC	sand,clay,gravel,mix	high plast.	MH	micaceous/diatomaceous
Soil density	very loose	loose	med. dense	Sand			high plast.	CH	high plasticity clay
	dense	very dense		no fines	SW	well graded gravelly	*Organic*		
Angularity	very ang.	angular	sub angular	little fines	SP	poorly graded gravelly	low plast.	OL	silty clay low plasticity
	sub round	rounded	well round	some fines	SM	silty-sand sandy-silt	high plast.	OH	clay med. to high plasticity
Note - density also in blows/foot above				some fines	SC	sand clay mixture	Peat	PT	humus,swamp soils, organic

* Source Unified Soil Classification System.

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Geologic Boring Log

East API Separator SWMU 03

Boring ID	Client:	Project:	Location
03-06	Puerto Rico Sun Oil Company	RCRA Facility Investigation	Yabucoa, Puerto Rico
Project No.	**AMAI Geologist/Engineer**	**Driller**	**Drilling Contractor**
	Néstor M Rivera	Mario Sierra	Jaca & Sierra
Date Started	**Date Completed**	**Drilling Method**	**Sampler type**
7/9/96	7/9/96	Tripod	2"x 24" Carbon Steel Split Spoon

Depth bgl (ft.)	USCS Symbol	Recovery (per 24")	Blow Counts (per 6")	PID (ppm)	Soil Description Description made from auger cuttings, unless otherwise noted. (grain size, sorting, moisture, color/hue etc.)
0	SM	12	1-1-1-1	0	**0-2 ft.** Silty sand. Loose, slightly moist, light olive brown (2.5Y5/4).
	Sample collected				Sand composed of quartz, mica, pyrite, shell and lithic fragments varying in
1					size from fine to coarse. Immunoassay samples collected.
					no visual contamination, no product odor
2	SM	12	1-1-2-2	0	**2-4 ft.** same as above and saturated, Hue light olive brown (2.5Y5/4).
	Sample collected				Sand composed of quartz, mica, pyrite, shell and lithic fragments varying in
3					varying in size from fine to coarse. No visual contamination, no odor.
					Immunoassay sample collected
4	SM				**4-6 ft.**
5					Continue drilling with pointer no soil sampling.
6					
7	SM	18	3-3-3-4	0	**7-9 ft.** Sand to silty sand to clay. Loose to stiff, moist to wet, dark grayish
	Sample collected				brown (2.5Y4/2) to black (Gley1, 2.5/N) to brown (7.5YR4/3). Sand composed
8					of quartz, mica, pyrite, shell and lithic fragments varying in size from fine to
					no visual contamination, no product odor, Immunoassay sample collected
9	SM	24	1-1-1-3	0	**9-11 ft** Sand - same as above, saturated, Hue yellowish
					to dark gray (5Y4/1) with black (Gley1, 2.5/N) mottles. Sand composed
10					of quartz, mica, pyrite, shell and lithic fragments varying in size from fine to
					to coarse. no product odor, no visual contamination
11					Boring terminated.

Soil Descriptions*

Type	Size (mm)			Gravel	Sym		Silt & Clay	Sym	
	Coarse	*Medium*	*Fine*	no fines	GW	well graded gravel	*Inorganic*		
Gravel	19-75		4.8-19	little fines	GP	poorly graded gravel	low plast.	ML	silts and very fine sand
Sand	2.0-4.8	.43-2.0	.08-.043	some fines	GM	sand,silt,gravel mix	low plast.	CL	gravelly,sandy,silty clay
Silt & clay			<.08	some fines	GC	sand,clay,gravel,mix	high plast.	MH	micaceous/diatomaceous
Soil density	very loose	loose	med. dense	Sand			high plast.	CH	high plasticity clay
	dense	very dense		no fines	SW	well graded gravelly	*Organic*		
Angularity	very ang.	angular	sub angular	little fines	SP	poorly graded gravelly	low plast.	OL	silty clay low plasticity
	sub round	rounded	well round	some fines	SM	silty-sand sandy-silt	high plast.	OH	clay med. to high plasticity
Note - density also in blows/foot above				some fines	SC	sand clay mixture	Peat	PT	humus,swamp soils, organic

* Source Unified Soil Classification System.

AMAI

611 Broadway Suite 907G

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Geologic Boring Log

East API Separator SWMU 03

Boring ID	Client:	Project:	Location
03-07	Puerto Rico Sun Oil Co.	RCRA Facility Investigation	Yabucoa, Puerto Rico
Project No.	**AMAI Geologist/Engineer**	**Driller**	**Drilling Contractor**
	Néstor M Rivera	Mario Sierra	Jaca & Sierra
Date Started	**Date Completed**	**Drilling Method**	**Sampler type**
7/9/96	7/9/96	Tripod	2"x 24" Carbon Steel Split Spoon

Depth bgl (ft.)	USCS Symbol	Recovery (per 24")	Blow Counts (6" each)	PID (ppm)	Soil Description (Descriptions made from auger cuttings, unless otherwise noted; grain size, sorting, moisture, color/hue etc.)
0	SM	6	4-5-2-2	0	**0-2 ft.** Sand. Loose, slightly moist, olive gray (5Y4/2). Sand composed of quartz, mica, pyrite, shell and lithic fragments varying in size from fine to coarse. No visual contamination, no product odor, Immunoassay samples collected.
1	**Sample collected**				
2	SM	10	1\12"-1	0	**2-4 ft.** Sand to silty sand. Loose, slightly moist, yellowish brown (10YR5/4). to dark olive gray (5Y3/2). Sand composed of quartz, mica, pyrite, shell and
3			1		varying in size from fine to coarse.
	Sample collected				product observed in soil. Immunoassay samples collected.
4					**4-6 ft.** Drilled from 4-6 ft with drive point, no soil sampling.
7	SM	12	1-1-2-3	23	**7-9 ft** Sand to silty sand. Loose, wet to saturated, dark olive gray (5Y3/2). Sand composed of quartz, mica, pyrite, shell and lithic fragments varying in size
8		↓			Product observed in soil
	Sample collected				Full analysis and Immunoassay sample collected
9					Boring terminated.

Well Construction Details

Casing material	Screen slot size	Screen Interval	Filter Pack	Cap Type
1.25 " x Schedule 40 PV	0.020 inch	1-6 ft.	No. 2 Silica sand	Watertight

Security casing/manhole:	Lock type:
none	none

Notes:

Well installed on 7/16/96. Filter pack ranged from 1-5 ft. Seal ranged from 0-1 ft. Riser was 29 ". Depth to groundwater was 3'3".

Well Development Data

Date:	Technique:	Volume purged:
	Centrifugal pump using 5/8" high density polyethylene hose.	

	Temp (°C)	SC (µS/cm)	pH	Notes: SC - specific conductance
Initial:	--	--	--	
Final:	--	--	--	

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Geologic Boring Log

East API Separator SWMU 03

Boring ID	Client:	Project:	Location
03-08	Puerto Rico Sun Oil Company	RCRA Facility Investigation	Yabucoa, Puerto Rico
Project No.	**AMAI Geologist/Engineer**	**Driller**	**Drilling Contractor**
	Gustavo Felipe	Constancio Olivo	Jaca & Sierra
Date Started	**Date Completed**	**Drilling Method**	**Sampler type**
6/21/96	6/21/96	3.25" ID - 6.00" OD Hollow Stem Auger	2"x 24" Carbon Steel Split Spoon

Depth bgl (ft.)	USCS Symbol	Recovery (per 24")	Blow Counts (per 6")	PID (ppm)	Soil Description Description made from auger cuttings, unless otherwise noted. (grain size, sorting, moisture, color/hue etc.)
0	SP	16"	3-6-5-3	3.7	**0-0.5 ft** Concrete coring **0.5-2 ft** Sand and gravel mix, Backfill zone, no visible contamination,
					Dry throughout, poorly sorted grains, loosely packed spoon,
1	**Sample collected**				Hue 7.5 YR 4/3 Brown Full analysis and Immunoassay samples collected.
2	SP	12"	1-3-1-1	0	**2-4 ft** Sand same as above, no visual contamination, no product odor Poorly sorted, and well packed spoon,
					Dry throughout, Hue 5Y 4/2 Olive Gray
3	**Sample collected**				Full analysis and Immunoassay samples collected.
4	SP			0	**4-6 ft** Sand same as above, no product odor, Dry throughout,
					poorly sorted, Hue 5Y 4/2 Olive Gray
5					
6		0"		0	**6-8 ft** No recovery sample again.
	CL	18"	1-1-1-1		**7-9 ft** Sand - little gravel, abundant silt, no visible contamination, Dry
					at top of spoon (9") saturated below, Groundwater encountered at 8 ft.
7					no visible contamination, no product odor
	Sample collected				Full analysis and Immunoassay samples collected.
8		▼			
					Grout to surface, repair concrete core,
9					Boring terminated

Soil Descriptions*

Type	Size (mm)			Gravel	Sym		Silt & Clay	Sym	
	Coarse	*Medium*	*Fine*	no fines	GW	well graded gravel	*Inorganic*		
Gravel	19-75		4.8-19	little fines	GP	poorly graded gravel	low plast.	ML	silts and very fine sand
Sand	2.0-4.8	.43-2.0	.08-.043	some fines	GM	sand,silt,gravel mix	low plast.	CL	gravelly,sandy,silty clay
Silt & clay			<.08	some fines	GC	sand,clay,gravel,mix	high plast.	MH	micaceous/diatomaceous
Soil density	very loose	loose	med. dense	Sand			high plast.	CH	high plasticity clay
	dense	very dense		no fines	SW	well graded gravelly	*Organic*		
Angularity	very ang.	angular	sub angular	little fines	SP	poorly graded gravelly	low plast.	OL	silty clay low plasticity
	sub round	rounded	well round	some fines	SM	silty-sand sandy-silt	high plast.	OH	clay med. to high plasticity
Note - density also in blows/foot above				some fines	SC	sand clay mixture	Peat	PT	humus,swamp soils, organic

* Source Unified Soil Classification System.

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Geologic Boring Log

East API Separator SWMU 03

Boring ID	Client:	Project:	Location
03-09	Puerto Rico Sun Oil Co.	RCRA Facility Investigation	Yabucoa, Puerto Rico
Project No.	**AMAI Geologist/Engineer**	**Driller**	**Drilling Contractor**
	Néstor M Rivera	Mario Sierra	Jaca & Sierra
Date Started	**Date Completed**	**Drilling Method**	**Sampler type**
7/10/96	7/10/96	Tripod	2"x 24" Carbon Steel Split Spoon

Depth bgl (ft.)	USCS Symbol	Recovery (per 24")	Blow Counts (6" each)	PID (ppm)	Soil Description (Descriptions made from auger cuttings, unless otherwise noted; grain size, sorting, moisture, color/hue etc.)
0	SP	16	8-5-3-2	65	**0-2 ft.** Gravelly sandy silt to sand. Loose to soft, slightly moist, brown (10YR4/3) to very dark gray (5Y3/1). Sand composed of quartz, mica, pyrite, shell and lithic fragments varying in size from fine to coarse. Immunoassay sample collected, no visible contamination, no product odor
1	Sample collected				
2	SM, SC	16	-12-1-1	72	**2-4 ft.** Sand to sandy clay. Loose to soft, slightly moist to wet, very dark gray (5Y3/1). Sand composed of quartz, mica, pyrite, shell and lithic fragments varying in size from fine to coarse. Immunoassay (and duplicate) samples collected. Product observed in sample.
3	Sample collected				
4	SM, SC	12	1-1-2-2	22	**4-6 ft.** Sand to silty sand, Hue dark gray, (5Y4/1) to yellowish brown (10YR5/6). Sand composed of quartz, mica, pyrite, shell and lithic fragments varying in size from fine to coarse. Hydrocarbon odor and free product observed.
5	Sample collected				
6					Immunoassay sample collected
7	SM	8	1-2-2-2	40	**7-9 ft.** Sandy silt to silty sand. Loose to soft, slightly moist to wet, very dark gray (5Y3/1) to yellowish brown (10YR5/4). Sand composed of quartz, mica, pyrite, shell and lithic fragments varying in size from fine to coarse.
8					product observed in soil
9	SM	12	2-4-2-2	3	**9-11 ft.** Silty sand, moist, loosely packed, Hue dark gray (5Y4/1). Sand composed of quartz, mica, pyrite, shell and lithic fragments varying in size from fine to coarse. Hydrocarbon odor and free product observed. Full analysis and laboratory samples collected.
10	Sample collected				
11					Immunoassay sample collected
					Boring terminated

Well Construction Details

Casing material	Screen slot size	Screen Interval	Filter Pack	Cap Type
1.25" X schedule 40 PVC	0.020 inch	3-10 ft.	No. 2 Silica sand	Watertight

Security casing/manhole:	Lock type:
none	none

Notes:

Well installed on 7/16/96. Filter pack ranged from 1-3 ft. Seal ranged from 0-1 ft. Riser was 43".

Well Development Data

Date:	Technique:	Volume purged:
	Centrifugal pump using 5/8" high density polyethylene hose.	

	Temp (°C)	SC (µS/cm)	pH	Notes: SC - specific conductance
Initial:	--	--	--	
Final:	--	--	--	

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Geologic Boring Log

East API Separator SWMU 03

Boring ID	Client:	Project:	Location
03-10	Puerto Rico Sun Oil Co.	RCRA Facility Investigation	Yabucoa, Puerto Rico
Project No.	**AMAI Geologist/Engineer**	**Driller**	**Drilling Contractor**
	Gustavo Felipe	Constancio Olivo	Jaca & Sierra
Date Started	**Date Completed**	**Drilling Method**	**Sampler type**
6/20/96	6/20/96	Tripod	2"x 24" Carbon Steel Split Spoon

Depth bgl (ft.)	USCS Symbol	Recovery (per 24")	Blow Counts (6" each)	PID (ppm)	Soil Description Descriptions made from auger cuttings, unless otherwise noted (grain size, sorting, moisture, color/hue etc.)
0	SP			0	**0-2 ft** Sand and gravel mix, poorly sorted, no visible contamination, Dry, Hue 10 YR 5/3 brown
1					
2	SP			0	**2-4 ft.** Med sand, slightly finer than above, little or no gravel or coarse sizes No visible contamination, Dry throughout, loosely packed, Hue 5Y 4/2 Olive Gray
3					
4	SP			0	**4-6 ft.** Sand - fine sand, little or no gravel or rock fragments, more silt than above, No visible contamination, no product odor, Dry throughout hue 5 Y 4/2 Olive gray
5		▼			
6	MI			0	**6-8 ft.** Sand and silt - dense sandy silt, no visible contamination, Saturated throughout, Hue chart #1 for gley 5/1 greenish gray. Drill to 11 feet and install temporary monitoring well point
9					**9-11 ft** dense clay observed at bottom of boring Temporary monitoring well installed, Screened interval 6-11ft
11					Boring terminated

Well Construction Details

Casing material	Screen slot size	Screen Interval	Filter Pack	Cap Type
1.25" X schedule 40 PVC	0.020 inch	6-11 ft	No. 2 Silica sand	Watertight

Security casing/manhole:	Lock type:
None	None

Notes:

Well Development Data

Date:	Technique:	Volume purged:
7/19/96	Centrifugal pump using 5/8" high density polyethylene hose.	55 Gallons

	Temp (°C)	SC (µS/cm)	pH	Notes: SC - specific conductance
Initial:	25	860	7.26	No product odor in purge water.
Final:	25	840	6.99	

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Geologic Boring Log

Watery Oil Separator SWMU 43

Boring ID	Client:	Project:	Location
43-01	Puerto Rico Sun Oil Company	RCRA Facility Investigation	Yabucoa, Puerto Rico
Project No.	**AMAI Geologist/Engineer**	**Driller**	**Drilling Contractor**
	Néstor M. Rivera	Mario Sierra	Jaca & Sierra
Date Started	**Date Completed**	**Drilling Method**	**Sampler type**
6/27/96	6/27/96	3.25"ID-6.00"OD-Hollow Stem Auger	2"x 24"36" Carbon Steel Split Spoon

Depth bgl (ft.)	USCS Symbol	Recovery (per 24")	Blow Counts (per 6")	PID (ppm)	Soil Description Description made from auger cuttings, unless otherwise noted (grain size, sorting, moisture, color/hue etc.)
0	CL, SP	20	1-2-1-1	71	**0-2 ft.** Sandy clay to sand. Poorly sorted, stiff to loose, slightly moist light yellowish brown (10YR6/4) to light gray (Gley 1, 7/N). Sand composed of quartz, mica, pyrite, shell and lithic fragments. Hydrocarbon odor and visible product. Immunoassay sample collected.
1	**Sample collected**				
2	SP	12	6-19-11 68-9-11	12	**2-3.5 ft.** Sand. Poorly sorted, loose, slightly moist, black (Gley 1,2.5/N) Sand composed of quartz, mica, pyrite, shell and lithic fragments. Hydrocarbon odor and free product observed. Concrete slab encountered at 2.5 to 3 ft. Immunoassay sample collected.
3	**Sample collected**				
4	SP	16	7-8-9-5	3	**3.5-5.0 ft.** Sand. Poorly sorted, loose, slightly moist, light gray (Gley 1, 7/N). Sand composed of quartz, mica, pyrite, shell and lithic fragments.
5	SP	12		40	
6					
7					
8					
9					
10					

Soil Descriptions*

Type	Size (mm)			Gravel	Sym		Silt & Clay	Sym	
	Coarse	*Medium*	*Fine*	no fines	GW	well graded gravel	*Inorganic*		
Gravel	19-75		4.8-19	little fines	GP	poorly graded gravel	low plast.	ML	silts and very fine sand
Sand	2.0-4.8	43-2.0	.08-.043	some fines	GM	sand,silt,gravel mix	low plast.	CL	gravelly,sandy,silty clay
Silt & clay			<.08	some fines	GC	sand,clay,gravel,mix	high plast.	MH	micaceous/diatomaceous
Soil density	very loose	loose	med. dense	**Sand**			high plast.	CH	high plasticity clay
	dense	very dense		no fines	SW	well graded gravelly	*Organic*		
Angularity	very ang.	angular	sub angular	little fines	SP	poorly graded gravelly	low plast.	OL	silty clay low plasticity
	sub round	rounded	well round	some fines	SM	silty-sand sandy-silt	high plast.	OH	clay med. to high plasticity
Note - density also in blows/foot above				some fines	SC	sand clay mixture	**Peat**	PT	humus,swamp soils, organic

* Source Unified Soil Classification System

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Geologic Boring Log

Watery Oil Separator SWMU 43

Boring ID	Client:	Project:	Location
WOS-1	Puerto Rico Sun Oil Co.	RCRA Facility Investigation	Yabucoa, Puerto Rico
Project No.	**AMAI Geologist/Engineer**	**Driller**	**Drilling Contractor**
	Néstor M. Rivera	Constancio Olivo	Jaca & Sierra
Date Started	**Date Completed**	**Drilling Method**	**Sampler type**
7/16/96	7/16/96	Tripod	2"x 24" Carbon Steel Split Spoon

Depth bgl (ft.)	USCS Symbol	Recovery (per 24")	Blow Counts (6" each)	PID (ppm)	Soil Description (grain size, sorting, moisture, color/hue etc.)
0	SP	18	1-2-2-3	61	**0-2 ft.** Sand. Poorly sorted, loose, slightly moist, dark greenish gray (Gley 1, 3/1,10Y) to olive grey (5Y4/2). Sand composed of quartz, mica, pyrite, shell and lithic fragments varying in size from fine to coarse. Diesel odor and free product observed.
1					
2					
3					**2-5 ft.** Borehole drilled with pointer. No sampling completed.
4					
5	SP	12	11-14 12-8	14	**5-7 ft.** Sand. Poorly sorted, loose, slightly moist to wet, greenish gray (Gley 1,5/1). Sand composed of quartz, mica, pyrite, shell and lithic fragments varying in size from fine to coarse.
6		▼			
7					Boring terminated.

Well Construction Details

Casing material	Screen slot size	Screen Interval	Filter Pack	Cap Type
2" X schedule 40 PVC	0.020 inch	2-5 ft.	No. 2 Silica sand	Watertight

Security casing/manhole:	Lock type:
none	none

Notes:

Well Development Data

Date:	Technique:	Volume purged:
	Waterra valve with 5/8" high density polyethylene hose.	

	Temp (°C)	SC (µS/cm)	pH	Notes: sc - specific conductance
Initial:				
Final:				

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Geologic Boring Log

Watery Oil Separator SWMU 43

Boring ID	Client:	Project:	Location
43-02	Puerto Rico Sun Oil Company	RCRA Facility Investigation	Yabucoa, Puerto Rico
Project No.	**AMAI Geologist/Engineer**	**Driller**	**Drilling Contractor**
	Néstor M. Rivera	Mario Sierra	Jaca & Sierra
Date Started	**Date Completed**	**Drilling Method**	**Sampler type**
6/27/96	6/27/96	Tripod	2"x 24" Carbon Steel Split Spoon

Depth bgl (ft.)	USCS Symbol	Recovery (per 24")	Blow Counts (per 6")	PID (ppm)	Soil Description. Description made from auger cuttings, unless otherwise noted. (grain size, sorting, moisture, color/hue etc.)
0	SP	18	2-2-3-3	NR	**0-2 ft.** Silty sand. Poorly sorted, loose, slightly moist to moist, dark brown (7.5YR3/3) to dark gray (Gley 1, 4/N). Sand composed of quartz, mica,
1					pyrite, shell and lithic fragments varying in size from fine to coarse.
	Sample Collected				Immunoassay sample collected.
2	SP	12	3-11-7	168	Sand composed of quartz, mica, pyrite, shell and lithic fragments varying in
3	**Sample Collected**				size from fine to coarse.
	SP	12	5-6-8	184	immunoassay sample collected.
4					**3.5-5.5 ft.** Sand.Poorly sorted, loose, moist to wet, light grey (Gley 1, 7/N).
5					size from fine to coarse. Hydrocarbon odor and free product observed.
	SP	20	5-2-3-4	6	**5.5-7.5 ft.** Silty sand. Poorly sorted, loose, moist to wet, light grey (Gley 1,
6					7/N) to brown (7.5YR4/2) to black (Gley1,2.5/N). Sand composed of quartz,
7	**Sample Collected**				mica, pyrite, shell and lithic fragments varying in size from fine to coarse. Hydrocarbon odor. Immunoassay sample collected.
					Boring terminated.
8					

Soil Descriptions*

Type	Size (mm)			Gravel	Sym		Silt & Clay	Sym	
	Coarse	*Medium*	*Fine*	no fines	GW	well graded gravel	*Inorganic*		
Gravel	19-75		4 8-19	little fines	GP	poorly graded gravel	low plast.	ML	silts and very fine sand
Sand	2.0-4.8	.43-2.0	.08-.043	some fines	GM	sand,silt,gravel mix	low plast.	CL	gravelly,sandy,silty clay
Silt & clay			<.08	some fines	GC	sand,clay,gravel,mix	high plast.	MH	micaceous/diatomaceous
Soil density	very loose	loose	med. dense	Sand			high plast.	CH	high plasticity clay
	dense	very dense		no fines	SW	well graded gravelly	*Organic*		
Angularity	very ang.	angular	sub angular	little fines	SP	poorly graded gravelly	low plast.	OL	silty clay low plasticity
	sub round	rounded	well round	some fines	SM	silty-sand sandy-silt	high plast.	OH	clay med. to high plasticity
Note - density also in blows/foot above				some fines	SC	sand clay mixture	Peat	PT	humus,swamp soils, organic

* Source Unified Soil Classification System.

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Geologic Boring Log

Watery Oil Separator SWMU 43

Boring ID	Client:	Project:	Location
WOS-2	Puerto Rico Sun Oil Co.	RCRA Facility Investigation	Yabucoa, Puerto Rico
Project No.	**AMAI Geologist/Engineer**	**Driller**	**Drilling Contractor**
	Néstor M. Rivera	Constancio Olivo	Jaca & Sierra
Date Started	**Date Completed**	**Drilling Method**	**Sampler type**
7/16/96	7/16/96	Tripod	2"x 24" Carbon Steel Split Spoon

Depth bgl (ft.)	USCS Symbol	Reco-very (per 24")	Blow Counts (6" each)	PID (ppm)	Soil Description (grain size, sorting, moisture, color/hue etc.)
0					Boring drilled without collecting samples. Material encountered was sand, loose, dark gray (Gley 1, 4/N), composed of quartz, mica, pyrite, shell and lithic fragments varying in size from fine to coarse. Hydrocarbon odor and free product observed.
1					
2					
3					
4					
5					
6		▼			
7					
8					
9					

Well Construction Details

Casing material	Screen slot size	Screen Interval	Filter Pack	Cap Type
2" X schedule 40 PVC	0.020 inch.	4-9 ft.	No. 2 Silica sand	Watertight

Security casing/manhole:	Lock type:
none	none

Notes:

Well Development Data

Date:	Technique:	Volume purged:
	Centrifugal pump using 5/8" high density polyethylene hose.	

	Temp (°C)	SC (µS/cm)	pH	Notes: SC - specific conductance
Initial:				
Final:				